ELECTRICAL REVIEW

[ILLUSTRATED.]

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The Schaefer Incandescent System.

The improvements in the field of incandescent lighting have during the last few years been so great, that the adoption of this means of illumination is taking a strong hold upon the public. The conviction is everywhere becoming felt that the experimental stage has long been past. One of the most enterprising and successful in this branch of electrical business is the Schaefer Electric Light Company, whose system is the subject of this article. The dynamo, of the Siemens type, shows many excellencies of construction. The armature is wound with two layers of copper wire, the core being composed of sheet-iron disks magnetically and electrically insulated from each other and from the shaft. The sheets are separated by paper washers, and the whole is firmly held together by iron end plates.

The brushes are double, and when lifted from the commutator are held by a catch. In this way the trouble of removing them is unnecessary when it is desired to run the machine without taking current. The number of commutator sections is from forty upwards. The field magnets have heavy cast-iron pole pieces, the magnet cores themselves being of soft wrought iron. The field of the machine is so much more intense that it has a capacity 35 per cent. greater than if cast iron were used. The field is wound with coarse series wire next to the iron, and the fine shunt wire outside. The amount of wire used is so proportioned that the machine is entirely self-regulating, without any outside mechanism or artificial resistance. There is provided, however, a resistance box for the shunt coils, so that the machine may be adapted for varying speeds of the engine used, or in case it is desired to vary the candle-power of the lamps in the circuit. Dynamos giving 100 to 110 volts to run 150 and 200 lights are manufactured; the efficiency is claimed to be 96 per cent.

The lamp has for the incandescent portion a carbon filament made primarily of silk, and treated in such a way that, on account of its great uniformity and flexibility, it can be tied into a knot. The carbon is connected in the usual way with platinum wires, hermetically sealed in the glass bulb, from which the air is exhausted to a very high vacuum, thus insuring the life of the lamp and preventing all discoloration. They have a guaranteed life of 600 hours, though the average is much higher. The efficiency is high, a 16 candle-power lamp requiring 100 volts and .6 amperes, and it is guaranteed that 10 to 12 lamps can be run per horse power. The company also make lamps from 10 to 100 candle-power in various sizes.

The holder can be screwed on to existing gas fixtures or other attachments. The wires are connected, it is stated, so there is no possibility of a short circuit. The two contacts which convey current to the lamp have underneath a spring, which always insures good contact with the lamp terminals.

The switch is positive in its action, remains at "on" or "off" without being moved by jarring, is simple in construction and can be handled roughly without danger. The lamp sockets are provided with slight projections which hold the lamp firmly, while by a single motion it can be removed or attached to the holder. The socket is made with a rim which holds the shades, no brackets or complicated supports being required. The contact pieces of the lamp socket are embedded in an insulating compound, which holds them firmly in their places and is not in the slightest degree an absorbent of moisture. Switches for 10 to 200 lamps are made with double contacts.

FIG. 3.— WALL SWITCH OF SCHAEFER SYSTEM.

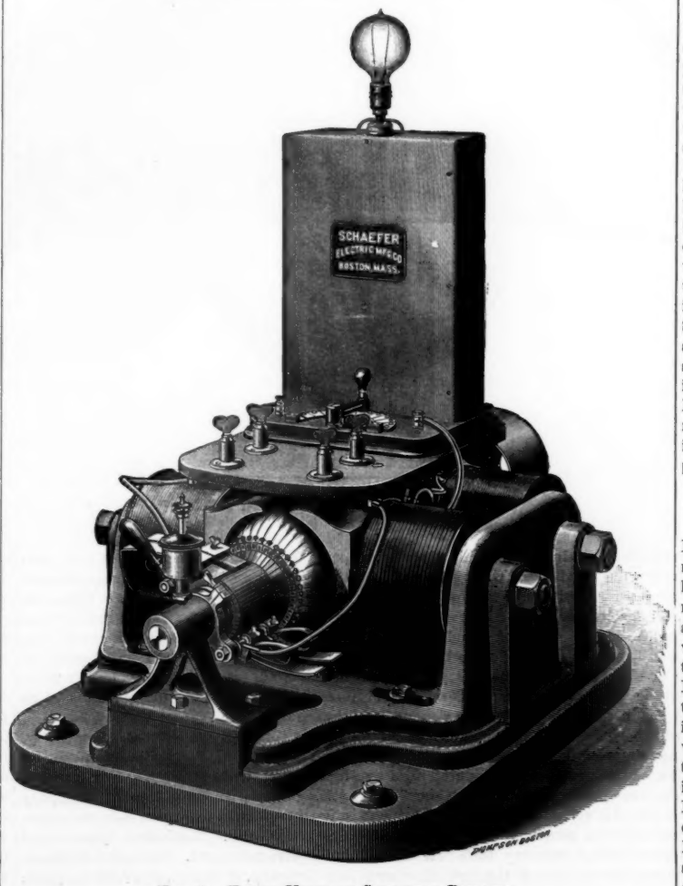

FIG. 1.—FRONT VIEW OF SCHAEFER DYNAMO.

An imperfect contact and arcing are prevented by a spring which instantly opens the switch to full distance. Safety fuses of novel construction are supplied with every lamp and all large switches. The fusible substance is held by springs between two pieces of mica, and in the event of fusing drop onto a metal cap, which is insulated from all wires or contacts. Designs are in progress for various styles of ornamental brackets adapted to replace the more elaborate forms of gas fixtures.

A plant of this system is in operation in the shoe factory of Varney & Hayes, Haverhill, Mass.; 250 16-candle-power lamps are used, run from two dynamos.

A plant is just being started in the factory of the Putnam Tool Company, Fitchburg, Mass. There are to be 225 16-candle-power lamps, and the power will be taken from engines already in use.

The company have a contract for a plant for the Continental Brewery, owned by Charles A. King, Longwood avenue, Roxbury.

The Schaefer system is particularly excellent in mechanical details. The machines require no attendance; there are no sparks at the brushes, which have to be seldom trimmed. The bearings run perfectly cool and the company claim it is impossible to burn out an armature even by short circuiting. The company work under patents owned exclusively by themselves, and having acquired all the patents for their own protection they will guarantee the same to their customers. In the line of "monster" 100 candle-power lamps, those made by the company are suitable for illuminating large areas in place of the arc light, giving a light which they state much better both in in distribution and character, and more economical in maintenance. A catalogue will shortly be published, giving full description of the system. Mr. Leo. Schlegelmilch is president of the company, and Mr. Fred. Schaefer is electrician. The factory is situated on the corner of Main and Osborne streets, Cambridgeport, Mass., in the building formerly occupied by the Walworth Manufacturing Company. Their laboratories are provided with the latest improved instruments for measuring, testing and experimenting.

Another Genius with Sublime Hindsight.

Mr. Alexander G. Nye, formerly of North Falmouth, but now residing in Weymouth, has a little electrical instrument of his own make which works in the same manner that the telegraph of to-day operates. He claims that he conceived the idea which underlies the present vast system of telegraphy before Mr. Morse did. When Mr. Nye heard the anouncement read that the telegraph had worked successfully he instantly exclaimed that there was but one way in which it could work and that was by the magnet system which he had elaborated into the little home-made instrument. Mr. Morse obtained his patent and so Mr. Nye did not push his invention into notice. Mr. Nye is a dentist and a chemist, being as he says one of two persons in this country who can melt platinum. He has also many orders from Boston for purifying gold.

* * Montgomery, Ala., expects to have its electric railway running in a few days.

More Valuable Than Gold.

The following is a list of metals, the value of which is greater than gold, with their value per avoirdupois pound:

Vanadium—A white metal, discovered in 1880, $10,000,

Rudidium—An alkaline metal, so called, for exhibiting dark red lines in the spectrum analysis, $9,070.

Zirconium—A metal obtained from the minerals zircon and hyacinth in the form of black powder, $7,200.

Lithium—An alkaline metal, the lightest metal known, $7,000.

Glucinum—A metal in the form of a grayish black powder, $5,400.

Terbium—Obtained from the mineral gadolimite found in Sweden, $4,080.

Yttrium—Discovered in 1828, is of a gray-ish black color, and its luster perfectly metallic, $4,080.

Erbium—The metal found associated with yttrium, $3,400.

Cerium—A metal of high specific gravity, a grayish white color, and a lamellar texture, $3,400.

Didymium—A metal found associated with cerium, $3,200.

Ruthenium—Of a gray color, very hard and brittle, extracted from the ores of platinum, $2,400.

Rhodium—Of a white color and metallic luster, and extremely hard and brittle. It requires the strongest heat that can be produced by a wind furnace for its fusion, $2,300.

Barium—The metallic base of baryta, $1,800.

Calcium—The metallic base of lime, $1,500.

Palladium—A metal discovered in 1802, and found in very small grains, of a steel-gray color and fibrous structure, $1,400.

Osmium—A brittle gray-colored metal found with platinum, $1,300.

Strontium—A malleable metal of a yellow-ish color, $1,200.

Iridium—Found native as an alloy with osmium in lead-gray scales, and is the heaviest of known substances, $1,090.

* * MM. Fouque and Michel Levy have made experiments recently with the steam hammer at the Creusot Works to determine the velocity of propagation of vibrations through the ground. The blow of the 100-ton hammer is not felt by the senses beyond 1,200 meters, but it is perceptible by proper apparatus such as the nadiral apparatus of astronomers. In the Permian rocks of Creusot the speed of the wave is about 1,200 meters per second parallel to the strata, and 1,050 meters per second perpendicular to them. In the sands of Meudon, on the other hand, the speed of a shock was found to be about 320 to 360 meters per second; but the wave was longer in this case, that is to say it lasted longer. MM. Fouque and Levy have devised an apparatus for automatically recording the speed of propagation, and the intensity and duration of the vibrations produced by a distant shock. It consists of a gelatino-bromide plate made to turn before a pencil of luminous rays reflected from a mercury bath. A shutter closing the aperture of the dark chamber is opened by electricity at the moment of the initial shock, and a second shutter closes the chamber before a complete turn of the sensitive plate. In this a record to the one-fiftieth part of a second is obtained

Electric Light and Gas Companies.

Gas companies are conservative. This statement is truer of the Eastern than of the Western section of the United States. Opposed by principle to any rival illuminant, they have often seen outside capital establish electric-light plants, and earn a percentage on the cost of the plant equal to that of the gas company.

If electric-light plants are profitable when managed by a separate company, how much more successful would be their operation if under the control of the local gas company. The same officers, and nearly the same employes, could do the work for a gas and electric system as well as for one alone. In many places huge piles of coke have and are still being accumulated, which can hardly be sold at any price. There would be no expense for building in many cases. In fact, the only increased running expenses incurred would be for coal and carbons. Then, too, in every case thus far, the introduction of electric lighting has largely increased the consumption of gas. No way would be more certain for a local gas company to increase its business than the operation of an electric light plant.

Some time ago the city of Schenectady, N. Y., was considering propositions for lighting the streets of that city by electricity. Among other parties, the local gas company offered to put in a plant, and light the streets by electric lights. Remington dynamos and lights were purchased. The Jarvis Engineering Company, of Boston, equipped the plant, composed of two Armington & Sims 60 horse-power engines, belted direct to the dynamos, and a six-feet diameter, by sixteen feet long, steel tubular boiler, set with Jarvis Furnace to burn cheap fuel. The plant is an assured success, and the gas company, no less than the citizens of the place, are much pleased with the new departure.

* * Goods are made to a considerable extent in Saxony from a textile fiber obtained from the needles of the fir tree. The needles, young and green, are dried and subjected to a settling and fermenting process similar to that in use for flax, which softens the woody parts and loosens them from the fiber, though the complete separation is only obtained after a lengthy boiling by steam. During this boiling a by-product appears, called fir-wood oil, which is similar to turpentine. The fiber is passed through a milling machine like those used for woolen cloth, and is carried and spun like cotton. Generally the carded fiber is mixed with a certain proportion of cotton or wool, and thus a kind of merino yarn is produced, which is worked in the hosiery frames into singlets, drawers, stockings, etc., these fabrics being then sold as anti-rheumatics and as a preventive of gout.

* * An intimate friend of Mr. Charles Ross, the well-known telegraph and telephone manager whose death we recorded last week, states it as his belief that the foundation of the disease that carried him off was laid while he was assistant superintendent of the Seventh District of the Western Union Telegraph Company, by overwork, incident to the National Democratic Convention of 1880, and the presidential campaign that followed. He was a man that would not allow any personal considerations to interfere with the performance of what he conceived to be his duty to his employer, and sometimes overdid nature.

Fig. 4.—Schaefer, Lamp, with Shade.

BOSTON ELECTRICAL NEWS.

The Milford Electric Light and Power Company using the Brush arc and incandescent systems, have ordered a duplicate 300 light incandescent machine. From the machine already in use there are lights running in stores and houses in some places 2,500 feet from the station without any diminution in candle-power. Seventy-five 16-candle-power lights are to be placed in the Grand Army Hall. This is one of the finest in the State, being built of Milford granite.

Jordan, Marsh and Company, of this city, have made a contract for a Brush arc light plant to light the whole of their extensive establishment.

An experimental car of the Enos elevated railroad system is being fitted at the Daft factory in New Jersey, with motors.

It has been suggested that the earth is an enormous dynamo and that some one may some day discover a way to collect the immense currents generated. Here certainly is a field for study. We should bear in mind, however, that while the earth may be considered as an armature, we have no field magnets to furnish a magnetic field. Suppose that objection be overcome, the current must be obtained at the expense of the earth's motion on its axis, for the energy of the rotation of the earth will be transformed into electric energy.

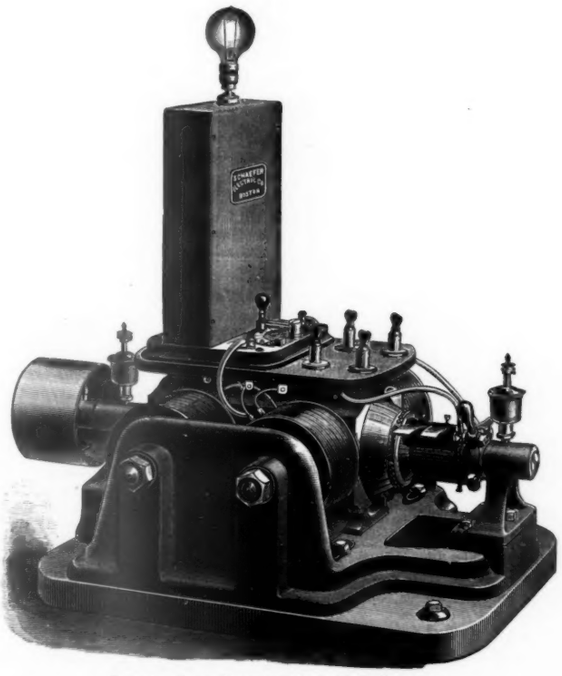

FIG. 2.—SIDE VIEW OF SCHAEFER DYNAMO.

Objection is sometimes made to the accumulation of a reserve fund by local electric light companies. The improvements, extensions and new demands made upon the companies furnishing electric current necessitate expenditures which must be met by an increase of capital or by a reserve fund. To the arc system has been added incandescent and to these will come the distribution of power. No company can afford to be unprepared to meet the demand for incandescent lighting and electric motors as fast as suitable apparatus can be supplied.

The committee on mercantile affairs of the Massachusetts Legislature have reported a bill authorizing the Cottage City Gas Company of Martha's Vineyard Island to supply that town with electric light and power. Capital stock is not to exceed $100,000.

Strange stories come to us of the enormous size and strength of the New Jersey mosquitoes. It has even been rumored that large numbers had been placed in a treadmill to generate power to run electric lights. The mosquitoes of New England are smaller but enterprizing. Not long ago one stopped a whole electric light plant by falling into the oil cup and clogging the oil hole. A heated journal was the result.

A pamphlet recently published in this city, entitled "Electric Lighting, its Present Condition," is a translation of a report made at Munich, Sept. 26, 1885, by N. H. Schelling, Ph. D. Whatever may be the state of electric lighting in the old world, the author's statements of the slow advance are what might be expected from one who writes from the side of the gas interests. It is, however, mainly to the assertions which have bearing to the electric interest of this country that we take exception. It certainly seems unfortunate that the insurance interests of Europe have not by proper regulations found the incandescent light safer as regards fire than gas. The experience in this country flatly contradicts the sweeping assertions of Dr. Schelling on this point. In referring to the experiments of Dr. Renk regarding the practical heating effects of the incandescent light and gas, it is stated that in a theater the temperature rose during the representation of a play 13.8° and 13.3° Fahr. in different parts of the house, while when gas was used the rise was 21° and 23° in the same places. The reader is allowed to infer that all the increase of temperature in the first case was due to the heat of the incandescent light. The rise in amount of carbonic acid was twice as much with gas as with electric light. Now no carbonic acid is set free by the glowing of an incandescent lamp, but the pamphlet allows one to infer that.

In a table showing the capitalization of electric light companies, it appears that while the shares of foreign companies have depreciated more than one half, the stock of American companies is nearly equal to its par value. The statement is made that in North America even electric lighting has not been adopted into regular practice. It is certain that Dr. Schelling was never in this country, and that a visit would supply him with much information he is now lacking.

Macullar, Parker & Company, after a five month's trial of a 30-light Ball arc light plant which has run 10½ hours daily have ordered a second machine. An arc light will replace each chandelier in the large salesroom, making it the best lighted clothing house in the country. The expense of running 60 lights will be less than one-half the former expense of 20 lights from the street circuits. In a few days the Ball Company will start at the Dunnell Manufacturing Company a plant to run 40 arcs and 50 incandescents on the same circuit.

The Boston Rubber Company, having their factory at Chelsea, Mass., will soon have running a Harris-Corliss engine. Besides the work of running various machinery there will be enough surplus power to drive a dynamo, it being the intention of the company to light their factory by electricity.

The Louisiana Electric Light and Power Company, of New Orleans, La., operating the Jenney system of electric lighting, contracted with the Bass Foundry Machine Company, of Fort Wayne, Ind., for twenty engines, under a guarantee of three pounds per indicated horse-power per hour. In a recent test made by Mr. Hoadley it was found that the consumption was above the guaranteed limit, and Corliss engines are to be substituted.

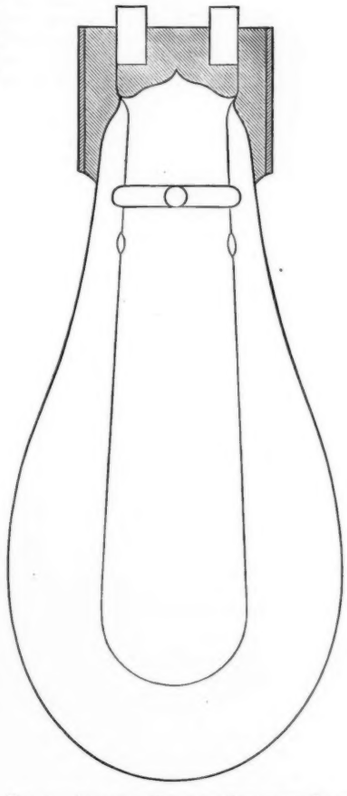

FIG. 6.—OUTLINE VIEW OF SCHAEFER LAMP.

The satisfaction given by the motors in the R. I. Printing Company's shop, 62 Weybosset street, Providence, R. I., and in other establishments in the same city, has lead to the formation of the Providence Electric Light and Power Company. The generator has been run at the factory of Wm. A. Harris, builder of the Harris-Corliss engine. The wires of the new company will be run through the following streets: Downing, Clifford, Washington, Broad, Exchange Place, making a circuit five miles long. The power required, 100 horse-power, will be obtained at Mr. Harris' factory. The company have a paid up capital of $50,000.

There is a good prospect of a surface electrical railroad in Providence before many months The charters of the present horse railroads are drawn in such a way that the cars of other companies can be run over existing tracts.

The labor problem coming up before the Slater Club, of Providence, an association composed of the business men of Rhode Island, the general expression of feeling was that if the trouble with the Knights of Labor is not stopped, the business of the summer and fall will be very light, and so firmly has the impression taken hold of them that their orders for supplies are limited in anticipation of strikes, and they are prepared at any time to shut down their mills. Many of the gentlemen thought that it would be to the decided advantage of the knights and manufacturers to have the former strike and stop every railroad and manufactory in the United States. The immediate rise in prices of all necessary supplies would be a plain lesson that the workmen are only striking to their own disadvantage.

The business of the Narragansett Electric Light and Power Company of Providence, R. I., using the Thompson-Houston system, has made excellent progress during the last year. Besides the 125 city lights, they furnish 261 arcs to stores. Their incandescent business has assumed large proportions,

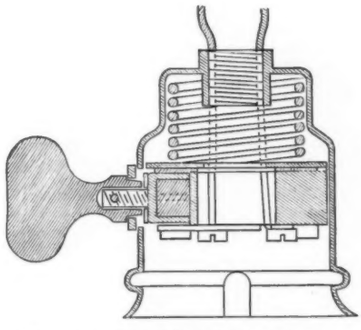

FIG. 5.—OUTLINE VIEW OF SWITCH AND SOCKET OF SCHAEFER LAMP.

51 distributors being now in use furnishing eight 16-candle-power lamps each.

The Armington & Sims Engine Company, are working to their full capacity. They have just completed engines for the Pennsylvania repair shops, the power to be used for electric lighting.

BOSTON, Mass., March 30.

* * A plan of lighting the streets of Batavia, N. Y., by electricity has been formulated that will no doubt be received with satisfaction in case it is shown that the expenses will be less, or no greater, than gas. It is proposed to have 61 lights, 11 in the center of the town to burn all night. All parts of the village will be well illuminated.

* * The prevention of decay in wood is said to be effectively accomplished by exhausting the air from the pores and filling them with a gutta percha solution, a substance which preserves the wood alike from moisture, water and the action of the sun. The solution is made by mixing two-thirds of gutta percha to one-third paraffine, this mixture being then heated to liquefy the gutta percha, when it is readily introduced into the pores of the wood, the effect of the gutta percha being, when it becomes cool, to harden the pores.

* * The current issue of the *Comptes Rendus* contains an interesting note upon the electrolysis of salts, relating principally to galvanoplasty. The experiments of M. Renard are borne out in several important points. In known solutions it is believed that the quantity of metal precipitated is proportional to the temperature. This proportion, however, would appear to increase in the inverse ratio to the density of the liquid. When the distance of the electrodes is successively doubled, the quantity of metal precipitated decreases in geometrical progression so long as the distance is less than 32 centimeters. Above this value the law is not applicable. When the two electrodes are identical the quantities of metal precipitated are proportional to the square root of their surfaces.

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We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

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Mr. Clark B. Hotchkiss, general agent for Day's kerite, has just furnished the Bell Telephone Company, of Missouri, at St. Louis, with several miles of 100 conductor kerite aerial telephone cable.

The telephone business has lost one of its most successful general managers in the departure of Mr. Wm. Kerr, of the Pennsylvania Telephone Company, who has resigned his position to go into the cattle raising business. He will be succeeded in the telephone company by his brother.

Mephistopheles had an unexpeced delight at the London Lyceum lately, where Mr. Irving is playing *Faust* with several electrical effects. Mr. Tyars, playing *Valentine* for the first time, forgot to attach the electrical apparatus to the handle of his sword. The consequence was that in the duel with *Faust* every time his weapon was touched by that of *Mephistopheles* the current ran up his arm and playfully tickled his funny-bone. This must have vastly amused the *Devil*, but Mr. Tyars cannot be prevailed upon to repeat the entertainment.

Mr. Charles Loew, Chairman of the New York Electrical Subway Commission, has been dangerously ill for several weeks, and nothing has been done by the Commission during that time. Mr. Loew is still a very sick man, and is visited three times each day by his physician.

The return from Europe, last week, of Mr. T. N. Vail and Mr. Geo. L. Phillips, is welcomed in telephonic circles. There is a very general opinion that one of these distinguished gentlemen will be prevailed upon to accept the presidency of the Western Electric Company, should it be decided to go outside of the present capable staff of that company to select a successor to Mr. Smoot, deceased.

Judge John Baxter, U. S. Circuit Judge for the district which includes Ohio, Michigan, Kentucky, and Tennessee, and before whom it had been decided to bring the suit to annul the Bell patent, died suddenly at the Hot Springs of Arkansas on Friday. As a judge he was known for his dislike of patents, and this fact had much to do with having the telephone suit brought in his circuit. His death further complicates and delays the suit, which, we presume, will be proceeded with as soon as the vacancy is filled.

The Western Union Telegraph Company is being sued for $2,000,000 by the Bankers and Merchants' Telegraph Company, the case being heard this week. This suit is for damages alleged to have resulted from a raid on the wires of the plaintiff company last July. The Western Union Company had obtained from Justice Donohue an order directing the receiver of the Bankers and Merchants' Company to deliver to the receiver of the Rapid Telegraph Company such of its property as was then in his hands. Under cover of that order, the linemen of the Western Union cut every wire entering the operating room of the Bankers and Merchants' Company without any attempt to determine what did or did not belong to the Rapid Telegraph Company. A number of distinguished lawyers are engaged, and the case is attracting much interest. Messrs. Roscoe Conkling, Robert J. Ingersoll and Edward Lauterbach will appear for the receiver of the Bankers and Merchants' Company, while Messrs. John F. Dillon, Aaron J. Vanderpoel and G. J. Eggleston will represent the Western Union Company.

The Brooklyn Subway Commission "reported progress" (which is more than the New York Commission has done) on Saturday last, and sent to the Mayor a review of what had been accomplished in the matter of placing wires underground in their city. Under the permission of the Board, the New York and New Jersey Telephone Company has laid a box conduit of creosoted wood through a number of streets, the system having a total length of 12,420 feet, with a maximum capacity of 600 wires, aggregating about 1,410 miles. In this conduit specially manufactured cables will be laid as soon as the weather permits. A number of different conductors are to be laid, thus enabling a practical and competitive comparison of their respective merits. An additional conduit is to be constructed immediately under the authorization of the commissioners, through about ten miles of the principal streets and avenues of the city, which will have a total capacity of about 6,500 miles of wire. Most of this conduit will be of creosoted wood, but a portion of the line will be devoted to the Dorsett and Richardson conduits, in order to allow a comparative test of the merits of the three systems. The commissioners make no recommendations regarding electrical light wires, and, in fact, report no progress. They ask for an appropriation to continue the work, which has thus far been carried on at their private expense, and assure the city that any money advanced for this purpose will be cheerfully repaid by the companies interested in the matter by an equitable assessment upon them.

THE BELL TELEPHONE COMPANY'S ANNUAL REPORT.

There are some points in the annual report of President Forbes, which the opponents of the Bell Company will do well to study closely. There is a large class of persons who desire to handle stocks at a profit—to buy for little and sell for much; there is a still larger class who desire that the telephone interests should be so reduced in value that what has been shown to be worth far more shall be sold at a mere nominal price, regardless of loss to a monopoly; and there is a still larger class, whose inclinations are towards communism, socialism, or any other ism which looks to a tearing down on general principles of any species of construction, whether it be architectural, industrial or scientific, in the hope that ruin may prove a stepping stone in some yet undeveloped way to a loftier eminence which the destroyer hopes or wishes to attain.

The enemies of the Bell Telephone Company include in their army the classes mentioned, and each of these is hopeful of attaining desired results by depriving the company of the rights which have been given them by the Government in a regular and legal way.

It has been the wish of these vandals to inveigle the Government into a controversy, which as individuals will cost them nothing, yet is maintained for their individual benefit. The weary, wounded, snake-like pace with which the case must progress is to their liking, for in the interim there is much that can be done in a speculative way, and the patents are gradually wasting away, with no possibility of renewal under the law.

It was planned in the outset that so soon as the Government had agreed to commence proceedings a general charge should be sounded from the lakes to the gulf, and a foregone conclusion was announced, that the prisoner—being under arrest—must be guilty, and have no rights save those of condemnation and punishment.

In accordance with this cut-and-dried arrangement we see the attorneys for the opponents of the Bell Company gravely demand a delay in proceedings looking to injunctions, because the Government is looking into the matter of the company's patents. After *that* question is decided will be time enough, say they, to act in this! And in the meantime, of course, you will permit us to use this refusal to enjoin us, your honor, as evidence to the poor, deceived people, that the Bell folks have no rights, that we may sell stock, start exchanges under their very eyes without fear of the monopoly.

The courts refused to suspend proceedings; and thus was one chief corner stone of the fraudulent edifice destroyed.

It was asked by the Bell Company that the suits already in the highest court of the land be advanced, which could easily be done, in place of this new suit which must either be so advanced or take its long, weary course of years to reach the call. No! nothing of the kind would do, for reasons best known to the enemy of the Bell Company the suit must be a fresh, spick-span-new one. This action seems to show upon its face a desire to delay rather than to hasten the justice which is to result from these upright proceedings, and savors strongly of being in the interest of certain of the classes mentioned above.

It has been hoped by many that the entire telephone field would be thrown by the courts into the public domain, and that then the thousand and one varieties, forms and shapes of speaking instruments would be placed upon the same level, like washing machines and rat traps.

The past year's experiences in Canada have shown how faulty is this reasoning, how untenable this position. The telephone business is like the telegraph business to an extent, but more like the mail service, in that but one system is needed, and that, to be a success, should include all, as the Post Office Department includes all who mail letters.

The Canada experience has shown that despite the adverse action of the Government, in annulling the Bell patents, the number of subscribers has increased from 7,418 to 9,614, which is more than in any previous year; and the net earnings show an increase from $119,000 in 1884 to $158,000 in 1885.

Reasoning from analogy, if in Canada, where the only hold the Bell people have is the fact that they are already on the ground, giving satisfactory service, how can the complete annulling of one or two of the original patents of Bell work greater injury here than there? And especially when that company has clear and undisputed patents controlling dozens of instruments and combinations which are necessary to perfect and complete work, and without which the larger exchanges will never—at least they never did—work satisfactorily.

It really does not seem as if the vandals had much to hope from the telephone suit, unless it be a satisfaction to see their common enemy fight for its life.

GENERAL WESTERN NEWS.

Indianapolis is struggling manfully with the old man of the sea which the legislature has placed around the telephone company's neck. The people have at last wakened to the fact that the Central Union Company means business when it says: "Gentlemen, we are going to get out of this State wherever a telephone exchange costs us more than it comes to"

477 of the Indianapolis subscribers were thrown out of service on the evening of the 31st of March, that number of contracts for exchange service expiring at that time. The astonishment of the parties interested was complete. Everybody, from the New York and Chicago dailies to the last suburban subscriber, has been shouting "bluff! bluff!" and predicting that no such rash move would be made by the telephone people. Now that the bluff is ended, and about half the exchange subscribers are closed up and the greater portion of the rest are "warned" for the close of the next quarter, there is a lively skirmish to know what to do next in order to thwart the common enemy and retain the service. It has become a ground-hog case.

The removal of the instruments will be resisted unless there is a compromise effected, on the ground that an exchange cannot be discontinued, and that while yet in operation the company can be forced to render exchange service to any who comply with the law and the company's rules, despite the letter of the contracts.

A local organization is announced which proposes in some way to run the exchange on a sort of co-operative plan, the mutual expense of which it is assumed will be about $4 per month per wire.

A meeting of the Central Union Board was called for the 3d instant, to consider the proposition to continue the Indianapolis exchange on this or some similar basis, but no conclusion was arrived at. It is not improbable, however, that a satisfactory result may eventually be reached, by which the business may be kept alive until the Supreme Court of the United States has passed upon the obnoxious law.

In the meantime a hundred thousand or less adventurers, each with "the best known system," "a great improvement on the Bell," "the telephone of the future," "the long-distance-far-speaking-crooked-line-round-a-hay-stack system," etc., etc. They are all there, and each is filled with patriotism—running over with a desire to benefit his fellow man—all regular Abou ben-Hassans—who want to take the place of the Central and other telephone folks, and run the State in their stead! Worse than that—in groping around the dark corners of the State it has been discovered that a syndicate has been slyly working with the Bell Company, who, as the wicked partners in the transaction are endeavoring to arrange for the continuance of the exchange on some sort of a lease—which is accepted by the enemy as further confirmation of the total depravity, inborn sin and thorough wickedness of the Bell Company and all its lineal descendants.

Then again it is rumored that an original experimentor has been discovered in Posey or Brown, or some other hoop-pole county, who will shortly astonish the world with the statement that he, way back "befo' the wah," had a telephone in the woods, which he kept hidden because his neighbors thought him a wizard, and to show which then was to endanger his life.

Just now it is Ohio who is ahead in the priority quarrying, and two bright and shining lights have come to the surface quite recently. From Youngstown, Ohio, comes the account of Mr. Lucien Rose's invention, which is no infringement on Bell's patent, and is capable of operating "long distances successfully." The company has worked very quietly and guarded its secret with great care. The correspondent, under date of 29th, says:

"Yesterday a practical test was made of the invention. The instrument was placed in the fifth story of the building, another in the basement, and connections were made with telegraph wires to Freeport, Ill. The circuit was 900 miles. The two wires of the circuit were 60 miles apart." "Pretty well done for a metallic circuit," says an old telephone man, looking over the writer's shoulder. "Undoubtedly this will work a revolution in the telephone business." And the next day comes another Tichborne claimant from New Lisbon, Ohio. From Indianapolis we learn that: "For the first time evidence is made public tending to show that S. D. Cushman, of New Lisbon, Ohio, invented and used a telephone at least ten years before Bell took out his patent. Mr. Cushman himself is in the city. He has for many months been collecting evidence to establish that he had in practical operation telephones in 1863. Affidavits shown testify that Mr. Cushman invented in 1851 a receiver similar to the one patented by Bell in 1875. He says he is able to establish priority of invention, and therefore to nullify the Bell patent. The Cushman invention is owned by the American Cushman Telephone Company, and its aim has been to provoke a suit against itself on the part of the Bell Company. It is claimed that several lines have been operated by the Cushman Company, but the Bell Company has made no effort to enjoin it. If the Cushman Company is granted permission it will establish an exchange."

Mr. Cushman is well known to the fire-alarm people throughout the country. There was a time when similar claims to priority over Farmer and Channing in fire alarm telegraph systems were made by a gentleman of the above name, but that was sometime ago—and, perhaps—but never mind. Bring on the evidence. After what has passed we may believe anything.

The annual report of the president of the American Bell Company for the year 1885 was published on the 31st ult. The telephone companies have almost to an individual been strenuously opposed to underground wires, for nearly as many reasons as the commander of a fortress gave for not firing a salute to his superior officer. There were thirteen of these, the first of which was that he didn't have any gun.

The equivalent reason why telephone wires will not work well underground, has seldom been urged, while nearly every other on the round globe has been given.

Still, despite the fact of dollars and cents, which is the true element of opposition to the underground ordinances everywhere, the telephone companies, as shown in this report, have in operation 3,428 miles of underground wires, distributed as follows:

Washington	992
Chicago	760
New York	627
Pittsburgh	614
Boston	289
Brooklyn	134
Baltimore	11
Milwaukee	1
	3,428

Sombody once said:

"Call a man a fool and he may brook it;
But keep your hands out of his breeches pocket,"
or words to that effect.

The regulators are at it in Iowa again. A bill passed the Senate on the 31st and went to the House, which, being brief, is reproduced here. The bill is as follows:

SEC. 1. That all telephone lines built and operated in the State of Iowa shall be subject to assessment and taxation in the same manner as is provided for the taxation of telegraph lines, as provided for in Chapter 59 of Acts of the Seventeenth General Assembly.

SEC. 2. That the provisions of Chapter 59 of Acts of the Seventeenth General Assembly relating to the manner of assessment and taxation of telegraph lines shall be alike applicable to the assessment and taxation of telephone companies now or hereafter doing business within the State of Iowa, so far as practicable.

The bill went to the House this afternoon, but was not taken up, as a special order had precedence. It will probably come up within a day or two, and will undoubtedly be passed.

The Western Union is having fun in Minnesota with the North American Telegraph Company which the former looks upon as an interloper. In the Ramsey County District Court an injunction was applied for to prevent the construction of the new line along the St. Paul and Duluth R. R. The W. U. has also brought suit against the railroad company for $10,000 damages on alleged violation of contract in conveying men and materials over its line for the North American Company.

Then again out at Moline the W. U. is having trouble with an electric light company and the city authorities.

The Western department of the Electrical Supply Company, of which Mr. F. S. Terry is manager, since their removal to 171 Randolph street, have been enabled to make a much better display of their goods, and the increased stock which has been the result of demand, has in its turn required the issuing of new catalogues. As one of these would hardly be convenient on account of size, others are to follow, these being made up for special classes of goods. For instance, the present, which is the first of a series, is made up entirely of illustrated descriptions of standard electrical instruments made by the Electric Manufacturing Company, every page of which is a credit to the printer as well as the establishment in whose interest it is issued. Mr. Terry is constantly increasing both the quantity and variety of the stock, and it is his intention to keep on hand everything pertaining to electrical enterprise, from a doubled pointed tack to the largest dynamo, so that of anyone, who is guilty of wanting anything in the electrical line, it may be said, "no guilty man escapes" without being properly and satisfactorily supplied according to his needs.

Denver, Colorado, has recently adopted the police patrol and signal system—the system of the Police Telephone and Signal Company, of this city. The people are in high glee over the good work done during the first week, and the prospective protection foreshadowed in the future. On balancing books for the first twenty-four hours, six calls and five arrests stood to the credit of the system. The second day there were eight calls and five arrests. The fifth day there were seven calls, each of which brought in a fish and one of them landed two. The total week's work of six days summed up forty-nine calls and forty-six arrests, and the best day, presumably Sunday, there were fifteen calls and sixteen parties "snatched."

Mr. Frank Kitton, chief operator of the Western Union, delivered a lecture before the Buffalo Electrical Society, on the 19th instant, on the "History and Development of the Telephone." Mr. Kitton made the subject quite interesting to his hearers, as well by the selection of a popular theme as by its treatment and the illustrations. Mr. Kitton wisely refrained from naming the winner in the little game recently opened at Columbus, but left the proprietorship of the original instrument to the court.

The Vandepoele people have vacated their old place on Van Buren and Franklin, and now occupy far better arranged premises at 15, 17, 19 and 21 North Clinton street.

They have just sold an 80-light plant for Texarkana, Texas, and one of 60 lights for Freeport, La.

Col. S. G. Lynch, broker, 144 La Salle street, gives the following telephone stock values:

Chicago	$360 @	$375
Central Union	50 @	51
Michigan	65 @	67
Iowa Union	15 @	18
Great Southern	25 @	30
Great Southern, Script, 60 cents on the dollar.		
Colorado	18 @	20
Rocky Mountain Bell	40 @	45
Missouri & Kansas	52 @	54
Missouri & Kansas, Script, 53 cents on the dollar.		
United	15 @	17
Cumberland	70 @	75
Wisconsin	110 @	112
Bell of Missouri	147 @	151

CHICAGO, April 5, 1886.

BOSTON ELECTRICAL NEWS.

The New York Insulated Wire Company report business as unusually active. There is a large demand for their insulated wires.

The New England Glass Works will soon put on the market their froted electric light globe, which diffuses the lights without absorption. The demand for globes is quite heavy.

The Thomson-Houston Company have installed at Yonkers, N. Y., 30 arc lights; at Gloversville, N. Y., 45 arc and 150 incandescents. In Brooklyn the Municipal Company will have 600 lights. At Natick, Mass., a 38-arc and 50-incandescent light plant has just been started. Galesburg, Ill., and Wichitaw, Kan., have each increased 30 lights. At Elmira, N. Y., a 150 arc-light plant has lately started. R. H. Stearns & Co., retail dry goods dealers, have given an order for 30 arc and 75 incandescent lights.

The Wiswell Electric Mining Machine Company have received a dynamo from the Eddy Electric Manufacturing Company, of Hartford, Conn. It has an E.M.F. of 80 volts, and is capable of giving a current of 24 amperes. The bed of the grinder is connected with one pole of the machine, while in the water the other pole dips. On account of the high resistance of the liquid (muddy water), it is necessary to use a dynamo of high E.M.F. The ore is ground to powder in the presence of mercury, the current assisting the amalgamation of the particles of gold by the mercury. Ores that with ordinary treatment are worthless, giving, perhaps, $3 to the ton, have been found by these improved processes to yield in some cases over $20 per ton. In this way a large market is opened for electrical apparatus.

April 1 a change was made in the management of the New England Telephone Exchange, whereby W. J. Denver, assistant manager, was placed in charge of the territory west of South Framingham, with an office at Springfield. Col. Keller, general manager, supervises personally the remaining territory. This arrangement dispenses with the services of one division superintendent.

The contract for the city lighting at Northampton, Mass., has been awarded to the Thomson-Houston Company of that city. There will be 43 lights on the streets, and the plant will be driven by an Armington & Sims engine.

The Magee Furnace Company's factory, on Marginal street, Chelsea, has been equipped with a 180-light Bernstein plant. The dynamo is of the four-pole Shuckert-Mordey style, with the brushes 45° apart. The field is compound wound, so proportioned that the machine is self-regulating. A bell indicator and signal lamp are placed near the machine, by which the engineer can be informed when the current is too strong or too weak. The wiring has been done in sections, so tha by suitable switches lamps may be turned on or off in large numbers. The motive-power is a 20 horse power Ball automatic engines which governs so exactly that no change in speed can be perceived when the load is thrown on or off.

April 1 saw a good joke at the State House. A hearing in regard to the petition of ex-Representative Bowman and others, for incorporation as the Somerville Elevated Electric Railroad Company, was announced for that day. The chairman and two other members only of the railroad committee appeared. As the petitioners did not come, the hearing was postponed.

The opposition against cable roads is taking shape. The cable people have a longing for Beacon street, at present the only unpaved road out of Boston. The cycling interest will use all their power against the passage of any legislation which takes away this street from the riding public.

A visit to the Meigs elevated railroad experimental station at East Cambridge, shortly after the exhibition of the workings of his system, disclosed the fact that a number of difficulties had arisen which had not been at all expected. The full-sized model track has a curve of 50 feet radius and a grade of 200 feet to the mile; the engine, drawing two cars, slowly passed up to the straight and level portion of the track, and then returned to the sheds where they are kept. It was found that the driving wheels of the locomotive had a tendency to ride up or down on the central rail, and so much was the strain that the iron was bent slightly and driven into the wood. The attachments of the cylinders to the boiler were not sufficiently strong.

A gang of workmen are at present engaged in placing upside down the iron coverings of the middle rail.

The cars being cylindrical in shape, present a novel appearance.

Capt. Meigs has no faith in the use of electricity as a motive-power, and fails to recognize the results already accomplished. The special features of his system were in a great measure designed to overcome troubles which have been entirely removed by the introduction of electric motors. If a motor be placed under each end of every elevated railroad passenger car, it will be found that for all practical purposes heavy grades and sharp curves can be passed, and that, too, without tearing the track to pieces.

BOSTON, MASS, April 6.

.... Assistant Superintendent Ray, of the Connecticut River Railroad, has secured a patent for his electric bell cord, and several of them are now in use on the trains.

.... Prof. Cleveland Abbe anticipates the time when each citizen shall have the right to pay ten cents and demand his special weather telegram, precisely as he pays his two cents and demands to have his letter carried by mail. A few years ago the highest attainable proportion of correct prognostigations was about eighty per cent.; now eighty-five per cent. is expected.

** An effort is at last being made to disinter the Sphinx. The work of exhumation is intrusted to Brugsch Bey, brother of the distinguished archæologist, who will carry out a plan formed by Sig. Maspero. About 20,000 cubic meters of sand must be cleared away. To expedite this task a little tramway has been constructed, and 150 laborers are engaged for the more mechanical portion of the toil. About Easter the work is expected to be completed. Then, when the rock out of which the statue has been hewn is laid bare, a broad circular walk will be constructed around it, and a high wall built to guard against future encroachments of desert sands.

Telephonic News

*** Telephonic matters in Indianapolis are still somewhat disturbed, and the citizens are endeavoring to decide what they will do without the telephone.

*** The Missouri and Kansas Telephone Company is adding on an average 60 subscribers a month to the Kansas City exchange, and another multiple switchboard has been ordered, which will give the exchange a capacity of 1,600 subscribers.

*** The Board of Directors of the Rocky Mountain Bell Telephone Company have declared a quarterly dividend of $1.00 per share, payable this month. This is the second dividend paid this year by this vigorous company.

*** The Electric Manufacturing Company of Troy, N. Y., will move its office and factory, May 1st, to more extensive quarters, at Greenbush, Rensselaer county, New York. This move will largely increase their facilities, and will enable them to promptly meet their growing trade in the electrical field.

*** At present it is customary to "ground' telephone and other electric wires by connecting the same to water and gas pipes. In the past and at present there has been but little cause for apprehension in regard to danger from this source, but as the number of wires increases, as electric light wires are brought in great numbers in close proximity to the existing wires and their ground connections, the danger is greatly increased, as a wide field for damage is opened when a broken wire conveying a high-tension electric current comes in contact with the present system of existing wire, connected as they are with a common ground.

*** At a recent conference between the Central telephone management and representatives of the city of Indianapolis, Mr. Wallick stated it was the company's earnest purpose to remove its plant, as it could not do business with profit under the present law. Mr. Brownell gave notice that the constitutionality of the Williams bill would be tested in the United States Supreme Court, which led Councilman Rooker to inquire if the company proposed to incumber the streets with its poles and wires in the interim, and yet render no service. It was admitted that fifty applications for telephone service were now on file, but that contracts could not be taken by the company, whereupon it was the unanimous sentiment of the committee to recommend an immediate repeal of the franchise. Definite action, however, was deferred until next Saturday, at which time another conference will be held.

*** Before the legislative committee, Auditor Boynton, of the New England Telephone Company, stated that the total expense to the company during the year 1885 was $699,994, which sum did not include the depreciation in property outside of bells. The average cost of maintaining an instrument was $41.72. This included royalties. Poles cost $30 apiece, were put in forty to the mile, and lasted ten years. The cost to New England telephone subscribers per call averaged four cents. The following showing was read for the nine months ending December 31, 1885:

City.	No. of Subscribers.	Gross Earnings.	Gross. Expenses
Holyoke.....	256	$9,536	$9,696
Lawrence.....	245	11,346	9,618
Worcester.....	699	26,272	26,514
Springfield....	614	20,303	19,896
Salem.....	410	15,906	12,474
Gloucester....	217	7,706	6,426
Lowell.....	677	26,664	22,392

It will be noticed that Lawrence paid by far the highest price per subscriber of any place in the list, over $46 each, to $37 for Holyoke and Worcester, $39 in Salem and Lowell, $35 in Gloucester, and $33 in Springfield.

The Toronto Telephone Exchange Burned.

The Toronto, Ontario, Telephone Exchange was completely destroyed by fire the morning of April 1st. The exchange was in the top of the *Mail* building. Arthur Porter, night operator of the Bell Telephone Company, who was on duty at night, was found lying in the press-room of the *Mail* building in the morning after the fire. He says that about 3 o'clock in the morning two strange men entered his office and clubbed and gagged him. He remembers nothing more until he was found. Porter had the appearance of having been roughly used. It is supposed that his assailants fired the building. The affair is being investigated. The loss to the telephone company alone will be $50,000, and several of the occupants of the building met with heavy loss.

Denmark Telephone Statistics.

The following, compiled partly from official sources and partly from information received from Messrs. Atzens and Thorstonson, telegraph engineers, of Copenhagen, will give our readers an excellent idea of the development of telephonic and telegraphic communication in Denmark:

TELEPHONES.

Towns.	Inhabitants.		Telephone Subscribers.	Annual Charge
Copenhagen.....	No. 315,000	connected	No. 1,900 23 public stations.	£ s. 8 10
Elsinore.....	9,000	connected	43	8 10
Kjoge *.....	3,500	connected	30	5 12
Nestred *.....	5,000	connected	20	2 0
Kallundborg.....	3,500	connected	40	5 12
Stage om Moen....	3,000	connected	30	2 16
Nyrjobing on Fubstor.....	5,000	connected	40	5 12
Nakkov on Laaland	6,000	connected	65	5 12
Odama.....	22,000	connected	201	5 12
Svendborg.....	8,000	connected	80	5 12
Nyborg.....	5,500	connected	17	5 12
Assem.....	3,500	connected	51	2 0
Faaborg and Ringe	3,500	connected	25	5 12
Middelfort	3,000	connected	37	4 0
Frederikshaven....	3,000	connected	35	2 16
Aalborg.....	15,000	connected	300	3 16
Randers.....	14,000	connected	50	3 16
Aarhus.....	25,000	connected	100	4 4
Horsans.....	13,000	connected	150	3 16
Veile.....	7,500	connected	67	3 16
Kolding.....	8,500	connected	130	2 16
Esbjorg.....	1,000	connected	43	2 4
22 towns.....	482,500		2,077	

* These are being connected, but connection not completed.

These telephones have all been established by local companies, and most of them pay a fair dividend.

The State telegraphs of Denmark comprise 1,270 English miles of land and sea lines (6,200 miles of wire) and 343 stations (7 in Copenhagen). The Copenhagen Town Telegraph Company has 14 stations in Copenhagen, and direct connection with the State Telegraph and Telephone Company's stations. Charge for a town message of ten words, 15 oere (2d.), and 1 oere (½d.) for each word above ten. The Store Nordiske Telegraph Elskab (Great Northern Telegraph Company), established in 1868 by Mr. Tietgen, of Copenhagen (capital, £1,500,000), has seventeen sea cables of the aggregate length of 6,053 nautical miles in Europe and Asia, and three stations in England, two in France, one in Sweden, three in Russia, one in Siberia, and four in China and Japan. The company possesses two steamers of 1,580 tons each, for laying and repairing cables, and the company's officers (all Danes) are constructing and managing extensive systems of Chinese State telegraphs.

About the "Turnbull" Telephone.

Editors Electrical Review:

Your REVIEW of 27th inst. contains some remarks about "the distinctive features of the *Turnbull* long-distance telephone," recently tested between this city and New York over the Postal Telegraph Company's lines, and which is being introduced to the investing public by a Pole, who represents himself to be a *Count*, and who served a short time as a private in the U. S. army during the late war.

Your notice of this instrument is calculated to inspire confidence in investors, and therefore I hope you will publish this my statement that the Turnbull transmitter—Patent No. 336,876, dated February 23, 1886—is clearly an infringement of the Patent No. 250,308, June 8, 1881, the property of the Molecular Telephone Company, in which company I own a large number of shares. The Turnbull patent may be a valid patent, for the modifications it has of the Patent 250,308, but the use of "carbon plates or bars suspended in an inclined position, and resting on carbon," constitutes the infringement. It is not surprising that the Turnbull transmitter operated well between Washington and New York—251 miles—for it is well known that the transmitter of the Molecular Telephone Company operated well between New York and Chicago—1,050 miles—in April, 1883. W. C. BARNEY.

917 Sixteenth street, Washington,
March 19, 1886.

The Cable Service of the American Telephone and Telegraph Company.

The American Telephone and Telegraph Company, who have the "long-distance" line between New York and Philadelphia, have for their submarine and underground some of the largest cables ever made, and their entire cable service is of Kerite.

Their line has seven submarine crossings, *i. e.*, North river, Kill von Kull, Arthur Kill, Raritan, Rancocas, and Delaware rivers, with an underground cable across Ridgway Park, and island in the Delaware river opposite Philadelphia.

At each of these crossings four submarine cables are laid, which with one exception at each crossing, are constructed as follows: The conductors (of which there are seven in each cable) are three No. 18 B. W. G. copper wires stranded together to insure flexibility and insulated with Kerite to an outside diameter of $\frac{1}{16}$ of an inch. Each conductor is separately taped and the seven laid up in cable form, the interstices between the conductor being filled with jute yarn. The assembled cores are then served with layers of hemp put on spirally, and each layer in an opposite direction to the last, and armored with eighteen galvanized iron armor wires, each weighing eight hundred and ten pounds to the mile.

The exception noted above is one cable at each crossing having each of its conductors composed of three No. 16 B. W. G. copper wires stranded together, equal in weight to two hundred and ten pounds of copper to the mile. These are treated precisely as in the other cables and armored with nineteen wires, each weighing 950 pounds to the mile. The service through these cables in connection with their overhead lines is admirable, no difficulty is experienced in speaking distinctly between the two cities, and this is largely due to the low resistance of the conductors and the high insulation in the cables.

The entire cable equipment was furnished by Mr. Clark B. Hotchkiss, general agent for Kerite, and is but one of the many successful pieces of electrical engineering undertaken by him, and adds to the long list of Kerite cables in use throughout the country, another proof of the excellence of home manufacturers.

*** A new and successful "electrical" maiden is reported from Macon, Ga., Minnie Calloway by name. She will go on the stage.

*** An Italian astronomer asserts that "the inhabitants of the planet Mars are making signals to the earth." The polite advances of our celestial neighbors call for an immediate response. Here's an opportunity for the telephone inventor.

*** Electricity has been employed to cut coal in some of the mines in Illinois. The cutting is described as done by a chisel at the end of a steel bar, fastened to a piston of soft iron in the middle of a cylindrical coil of insulated wire, and the desired reciprocating motion is given to the rod by reversing the current in the coils.

Some Pointed Comments by an Innocent Stockholder.

Editors of Electrical Review:

When I see the action of men in legislative bodies, exercising powers conferred upon them by the people, contrary to the interests of their constituents and the moral law, "Do unto others, etc," I am reminded of Shakespeare's saying: "Man, proud man, dressed in a little brief authority, plays such fantastic tricks before high heaven as make the angels weep." The course pursued by the city councils and the legislature of Indiana in reference to the Central Union Telephone Company is characterized by a spirit of malignancy and venomous hatred of mankind that has seldom been equalled. I ask myself do these men have any feeling of affection and brotherhood for their neighbors? Do they ever reflect how they would feel and act if they were innocent stockholders in the unfortunate Central Union Telephone Company? Do they understand how much odium they are attaching to themselves and their State by their reckless disregard of justice? If they do understand all this, and yet persist in robbing the innocent and breaking the golden rule, then I say they are no better than the prairie wolves that formerly ran over their domain and devoured any unfortunate member of the pack that met with accident and became disabled. Indiana has long stunk in the nostrils of the loyal, and has crimes and even treason that have gone unpunished. It is, perhaps, too much to expect justice at the hands of her citizens, who have been nourished upon malaria and cradled in swamps, but I hope that the purer, better blood of the U. S. Supreme Court will rebuke them and reestablish justice among them. Yours, W. H. WINSLOW.

PITTSBURGH, PA., Mar. 29, 1886.

The New Orleans Telephone Case.

The following review of the telephone case in New Orleans, in which a speedy decison is expected, will be of interest at the present time. The title of the case is the American Bell Telephone Company *vs.* The National Improved Company, and was begun Feb. 1, before Judges Pardee and Billings. Before the argument on the merits began, the defendants submitted a written motion to the Court, setting up the Government suit which was about to be commenced, and praying the Court to refuse a hearing to the Bell Company on the merits, pending the determination of that suit; and that motion was argued at length. The Court overruled it. Judge Pardee remarking that, "as he understood it, the defendants represented to the Court that there was a perfect defence to the Bell patent in the facts of the Government suit, and that therefore they did not wish to submit that defence to this Court." Being driven from this position, the defendants were compelled to disclose their case, and the Court held that they might re-open the whole discussion at whatever length they chose, and lay before the Court any defence to the patent which they were able to furnish. Under this ruling the defendants proceeded, and, in addition to all the defences which have been set up by the various other parties sued by the Bell Company. Mr. Van Benthuysen transferred the entire record offered by the Pan-Electric and himself to Secretary Lamar, from the Department of the Interior to the Circuit Court in New Orleans, just as it was printed for the use of the Secretary. The Bell lawyers waived all objections to the form of proof, and consented to its use, as if it had been regularly taken for the case. When, however, they examined the printed record, they found that several pages had been taken out of the book and replaced by other printed pages exactly similar in appearance, but containing entirely different matter. The trick was so artfully done that it might have escaped observation, but it did not.

The matter which they thus attempted to suppress was the affidavit of Prof. Nipher, who, as a witness for the petitioners in Washington, testified that since the affidavit

made by Adams, who was the author of the Pan-Electric book, which contained the defence of that company, and which was sworn to by its author to be true, he and Dr. Adams had tried the Bell telephone, Fig. 7 of his patent, and found that it was a practical, operative telephone, contrary to the affidavit sworn to by Adams in the first instance. This piece of evidence by the defendants themselves destroyed all that part of the defence which was founded upon the assertion that Bell's patent did not exhibit an operative telephone; and Van Benthuysen concluded he would withdraw that part of the case in New Orleans. Prof. Nipher's affidavit, however, was put in by the Bell people, and thus the original record was restored.

In place of the suppressed Nipher affidavit Mr. Van Benthuysen produced two or three other affidavits averring that the telephone of the Bell patent could not possibly be made to talk and submitted a pair made in accordance with the patent, and which the witnesses swore could not be made to talk. They also, in open court, challenged the Bell lawyers to produce a pair made in accordance with the patent which could be made talk. The result was that a pair was telegraphed for from Boston and produced, and talked with; and then the pair which the defendants swore could not talk, were taken by Prof. Ayres, of the University of New Orleans, and without any alteration or adjustment talked with; and this disposed of that part of the case suddenly.

In the Lamar record also was the Meucci defence, supported by a number of affidavits, including Meucci's, and upon which defence Mr. Assistant Secretary Muldrow had chiefly relied in his opinion that a suit ought to be brought by the Government. This defence was founded upon a memorandum book said to contain the diary of Meucci, the supposed inventor, in which he swore he had recorded the progress of his invention as it was made. But the Bell Company produced before the Court conclusive evidence that that book did not exist until long after the dates of the entries contained in it, and that it was the property of a New York commercial firm, whose name was printed in it, and who identified it as having been given to Meucci long after the supposed dates, while the firm itself did not exist until after those dates Upon this exhibition Van Benthuysen's counsel withdrew the Meucci defence as unworthy of belief, leaving Mr. Muldrow its sole supporter.

One of the counsel for the defendants, Mr. Beckwith, occupied twelve days in his argument, running through nearly three weeks. Before he began, the Bell counsel put to him in writing a set of questions which involved the entire accusation against Bell that he had obtained a knowledge of his invention from Gray's caveat. These were the questions

Will the defendants point out to the Court a single word of testimony, either by Gray himself or any other witness, that Gray ever made the invention of his caveat before Feb. 11, 1876, when he made a sketch?

Or that the caveat was written before Feb. 14?

Or that it was filed before Bell's application?

Or that Bell's specification was not sworn to Jan. 20, 1876?

Or that it has ever been altered in respect to the description of the telephone or the claim for the telephone (Claim 5) since it was sworn to?

Or that contradicted before the Secretary of the Interior the testimony of Wilber, the Examiner; Speer, the Commissioner; Pollock & Bailey, the solicitors, that the amendments were formal, and did not relate to the Gray caveat or to the speaking telephone described in the patent?

Will they point out to the Court a single word of testimony contradicting Wilber and Bell and Pollock, who swear that Wilber never showed the Gray caveat to Bell or his solicitors?

Will they explain to the Court how it could possibly invalidate Bell's patent if he had bribed Wilber to show him the caveat of Gray (which no one pretends), and had been furnished with a copy, when in fact his specification existed as it now is before the caveat was written, and has never been altered in respect to the telephone?

Bell and Wilber might be punished for the crime of bribery, but confiscating the patent Bell received, and which is now owned by purchasers for value, is not the penalty for that crime, and, if it were, is not triable in a court of equity.

Will they point out a single word of testimony in any part of the record, either here or in any of the suits, that Gray invented the speaking telephone before Bell's date, Jan. 20, 1876? Gray has been sworn several times on that issue, and has never so claimed.

If they cannot answer satisfactorily these questions, particularly the last, what ground is there, based upon Gray's pretensions, for a denial of the injunction here?

To these questions Van Benthuysen's counsel made no reply, and in his closing argument Bell's counsel said:

Now your Honors have heard the defendant's argument for twelve days, and not one of those questions has been touched, or attempted to be touched—simply because there is no answer to them. What do you think of that for a defence?

All the facts, including Gray's and Wilber's affidavits and the Patent Office proceedings, were before the Court in the record, and were discussed by the Bell lawyers; but Mr. Beckwith made no serious attempt to sustain the assertion of fraud on which the Government suit since commenced at Columbus, Ohio, is supposed to rest, but depended upon demonstrating to the Court, as he attempted to do by experiments, that the Reis telephone anticipated the Bell invention. Very little reference was made to any other anticipation, although there were some allusions. But, in reply, no attention was paid by the Bell counsel to any question of anticipation, except that of Reis.

The Circuit Court here, therefore, has before it the entire Government suit, just as the Pan-Electric petitioners presented it to Mr. Lamar, argued by the Bell lawyers, but practically abandoned by the defendants; and a rehearing of the Reis defence, founded not upon any new testimony on the subject, but upon experiments tried in court here in New Orleans, with Judge Pardee and Judge Billings participating in the experiments, for the purpose of demonstrating, if possible, that Reis had a talking telephone.

No attempt, however, was made to talk with a Reis machine by the defendants, and every affidavit which detailed any such attempt disclosed that the instrument called Reis's had been materially altered from the description and drawings given in the Reis publications.

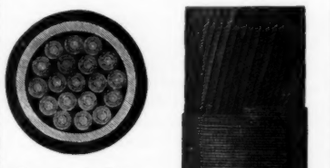


FIG 4.—20 CONDUCTOR, FARADAY TELEGRAPH CABLE

FIG. 2.—FARADAY ELECTRIC LIGHT CABLE.

FIG. 3.—100 CONDUCTOR, FARADAY TELEPHONE CABLE.

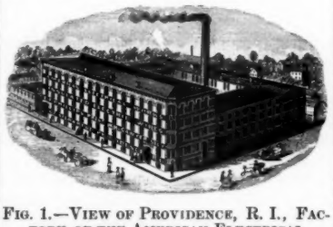


FIG. 1.—VIEW OF PROVIDENCE, R. I., FACTORY OF THE AMERICAN ELECTRICAL WORKS—MANUFACTURERS OF THE FARADAY CABLE.

The Faraday Cable.

The American Electrical Works, of Providence, R. I., have leased the plant and patents of the Faraday Electric Cable Company, of Cambridge, Mass.

The Faraday cable is not unknown to many of our readers, and is illustrated in the REVIEW in this edition. It consists of cotton-covered wires laid up into cables of any requisite number of conductors, which cables are subjected to a greatly improved process, by means of which the moisture is removed from the cotton fibre, and its place refilled by insulating materials of very low inductive power. The cable is then coated with lead in any lengths desired, by hydraulic pressure, and over the lead is placed a braid of cotton or hemp fibre saturated with waterproof material.

Telephonic tests of this cable, made by experts it is stated, show that it is entirely free from retardation and cross-talk up to lengths of five miles. No metallic circuits or tinfoil sheaths are used, the success of the cable being dependent upon its very high insulating power, combined with its extremely low specific inductive capacity.

The extensive plant of the Faraday Company will henceforth be entirely under the management of the American Electrical Works, of Providence, of which Mr. Eugene F. Phillips is the well-known president.

Application of Electricity to the Protection of Vineyards from Frost.

The damage which may be done in vineyards by frost in spring is so serious that in some districts grert care is taken to light fires as soon as the temperature falls dangerously near to freezing point, and to create clouds of smoke over the vineyard to prevent radiation as much as possible. In one district of France a telegraph inspector, Lestelle, has introduced an ingenious arrangement for rendering this smoke protection automatic, and applying it as speedily as possible in moments of danger. In the center of the vineyard he places a mercurial thermometer When this falls to two degrees above freezing point, the mercury closes the circuit of a small galvanic battery. This sets in motion a commutator worked by clockwork, which sends the current from a small Ruhmkorff inductor through several inductors of wire in succession. Corresponding to each of these circuits is a heap of suitable combustibles laid ready, and an ignition apparatus, which is fired by the current. These heaps of fuel are placed some 40 meters apart, and are, of course, so composed that their ignition is certain, and that they will smoulder and give off a maximum of smoke. With this apparatus the costs and the unreliability of night watchmen in early spring are done away with, and also the delay attendant on lighting the fires. If a sudden frost comes on, the whole vineyard is enveloped in a few seconds in a cloud of smoke. The cost of the apparatus is given as £4 10s. per hectare (equal to 2.47 acres), for which space seven fires are necessary to insure perfect protection.

* * In *Science*, of March 26, appears, as a supplement, a striking and comprehensive map of Central America, showing the Inter-Oceanic routes, recommended by the French Commission, under Commander L. N. B. Wyse.

* * Somebody asks: "Why is it that in England, where timber is scarcer, wood pulp is so much cheaper than here, where the trees are begging to be cut down?"

TELEGRAPHIC

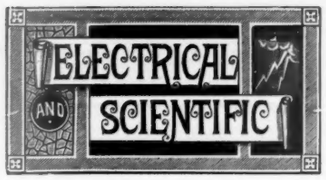
.... Mr. A. L. Parcelle, of New York, claims to have perfected a remarkable system of multiple telegraphy by which forty or fifty messages can be sent over the same wire.

.... Orders have been issued to all postal telegraph offices in London that messages are to be accepted without prepayment when tendered by officers of the police force within the Metropolitan Police district, and addressed to Scotland Yard on police business.

.... In reference to rolling steel wire of No. 9 gauge in Westphalia, it may be stated that this is done under the patent of Herr Boecker, which has been purchased by the Hoesch Steel Works, Dortmund. The chief feature of the invention consists in using two sets of rolling trains, which are arranged one behind the other. The wire goes from the first train in a straight line to the second, the rolls of the latter having a greater velocity, thus avoiding the formation of loops in the wire while it is passing from one pair of rolls to the other. It is said that there is no difficulty in rolling steel wire down to No. 9 gauge, or 3.76 mm., by this method.

.... Woburn, Mass., was visited by a furious tempest, accompanied with heavy bolts of thunder, sharp flashes of lightning, and a fall of large hail stones recently. At Central Square considerable damage was done, the main water pipe being struck in two places, allowing the water to burst forth. At New Bridge the pipe again suffered another break by a bolt striking it, but, as the pressure was off on account of the break at Central Square, not much damage was done by flooding. A short distance from the latter place a large white oak tree was struck, the fluid running down the trunk, tearing off the bark in its course and plowing up the earth at its base. A gang of men was put at work repairing the broken sections of the main. The people at North Woburn awoke to find themselves without any water supply, and for some time they could not understand the situation of affairs. They were entirely cut off, and for the day old wells and the old Middlesex Canal did the citizens of that part of the town good service.

.... A curious suit, arising from a mistake in the delivery of a telegram, brought by William Richman against the Western Union Telegraph Company, has just been decided by Judge Arnold. Richman is a poultry dealer in Yorketown, N. J. In October, 1881, he wrote to a New York poultry firm for a quotation, and received in reply a telegram reading "thirty-three cents for good young turkeys." When the telegram was put into his hand, he remarked to the operator, "Tom, that seems high. Haven't you made a mistake?" The operator replied, "I thought it was high, too, and I asked back whether they meant thirty-three, and they said yes." Richman thereupon went out into the adjacent country, and bought 2,900 lbs. of turkey at twenty-five cents a pound. He shipped them to New York, but the consignees refused to pay more than twenty-two cents a pound, which was the price named in the telegram which they actually wrote. The cost of packing and shipping to New York was one cent a pound, so that Rich man's actual loss was four cents a pound. He sued and recovered a verdict for this amount, whereupon the company moved for a new trial, which the judge refused, stating that "in an action against a telegraph company for the injury sustained through acting upon an altered message, the plaintiff establishes *prima facie* the negligence of the company by proving the difference between the message which the company agreed to deliver and that which it did deliver. That was shown in this case, and no legal excuse or defense being offered by the company the verdict for the plaintiff was right."



* * The Detroit press favors an extension of the franchise to the Dix Road Electric Railway, but thinks the city should have a share in the success of the enterprise. If it is a failure of course the city would be willing to pay its share of the loss.

* * A dispatch from London, April 1st., says: "C. S. Seyton, formerly a stock broker in New York, was to-day examining an electric gun of American invention, which he was about to introduce to British trade, when it was fired accidently, putting a bullet straight through Seyton's heart and killing him instantly. On Friday last Mr. Seyton lectured before the United Service Institute."

* * From a letter by Lieutenant Commander Tanner, U. S. N.: "Electric lights are in constant use on board the Albatross in our work of investigation. We have used an arc light hung near the water, but the form in use at present, which has been most successful, is an incandescent lamp attached to an insulated cable. Although certain species of fish in rivers, and near the coast, are attracted by a bright light, sea fish, as a rule, are rather repelled by it than otherwise. We do not use the light for the capture of edible fish, but only in collecting minute forms of crustaceans and surface specimens which we could not procure by any other means."

* * By means of the new and ingenious little instrument known as the hyalolyphotype, or hot pen, drawings can be made on glass or glassy substances with a waxy composition, which is solid and somewhat hard at ordinary temperatures. The pen is so contrived that it can be heated either by gas or by an electric current, and the waxy material flows easily from the heated pen, setting so quickly on the glass that cross hatching can be done more rapidly than with ordinary pen and ink, without risk of blocking up the angles; corrections, too, can be made with the greatest ease by means of a penknife, which leaves the surface afterward intact. After the drawing has been made, the plate is etched by fluoric acid, and when complete it can be either electrotyped, stereotyped, used direct, or applied to any purpose for which engraved surfaces are required.

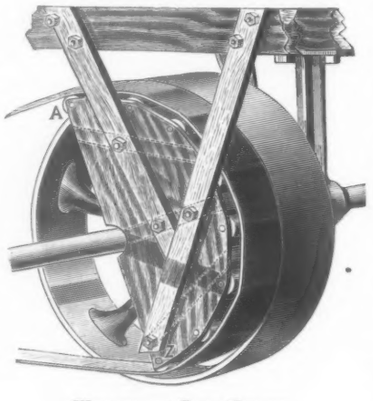
* * A Western exchange, in speaking of the Carthage, Mo., telephone business, says: "The executive department of this company is located, with the exception of its local manager, at Kansas City. The able officials are as follows: Hon. W. W. Smith, general superintendent, assisted by a former well-known Carthaginian, Prof. Charles McDaniels; Mr. C. D. Crandall, a gentleman of exceptionally good business qualifications, is the worthy secretary and treasurer; Mr. Chas. H. Maclilie, the genial auditor, is a young man widely known as an expert financier; he is asssisted by Mr. Rodney Ferguson, also a shrewd accountant, with unusual business insight. Superintendents Smith and McDaniels are widely known in telephone circles through their modern electrical inventions, including the *transo-electropho-telegrapho-perpetuo-motiono*, and McDaniels-Barrett *sinko-electro moneyo* switch board."

* * A Parisian millionaire, M. Lang, has recently had made for him a wonderful bed, which is certainly one of the most luxurious pieces of furniture we have yet heard of. If it could only become universal, what a boon it would be to early risers! The description makes one envy the fortunate possessor. The bed itself is a model of comfort and the following devices have been adopted to render rising from it as little unpleasant as possible. When it is time to get up a chime of bells ring. The occupant continues to sleep. Suddenly a candle is lit by a clever mechanical arrangement. The sleeper rubs his eyes and an invisible hand proceeds to divest him of his night cap. By means of electricity a spirit lamp with coffee-roasting apparatus affixed next begins to burn. The water soon boils and the smell of coffee fills the room with a delicious fragrance. Luxuriously revelling in a crowd of agreeable sensations the occupant, now just beginning to awake, is soothed by sounds proceeding from a costly musical box. At length the bells ring out another merry peal, and at the foot of the bed a card with "Levez-vous" ("Get up") inscribed on it appears. If this invitation is without effect a powerful mechanism lifts the occupant bodily from his bed and deposits him on the floor.

* * The inspector of buildings, of Washington, D C., has issued a permit to the United States Electric Lighting Company to use the steam power necessary for operating their machinery in square 574. The regulations require the consent of the real estate owners within a radius of ninety feet from the buildings occupied for the purpose. The application filed contains the signatures of parties owning 124,000 square feet of ground, or three-fourths of the entire square. At a meeting of the Board of Directors of the United States Electric Lighting Company a quarterly dividend of $1.50 was declared, payable April 1, from the earnings of the company during January, February and March.

The Wellington Belt Holder.

The belt holder of W. R. Santley & Co., which is illustrated on this page, takes its name from the place of manufacture, Wellington, Ohio, and is one of those practical devices that is of much value to the dynamo users. The work of shifting dynamo belts, with this device becomes simple and convenient, and is easily and quickly accomplished. Circulars will be sent to any of our readers who desire further information concerning this belt holder.



WELLINGTON BELT HOLDER.

Studying the Subject of Electricity.

Talking with Librarian Newton the other day about various branches of study, the conversation turned upon students of special topics.

"On what subject do you suppose more people read up than any other?" asked Mr. Newton.

History or political economy I fancied were most read.

"No," was the reply; "the subject of electricity is most studied. More people ask for books on electricity than on any other one topic."

I suppose that this means that there are hundreds of students digging into the baffling mysteries of electricity, studying its varying forms and cudgeling their brains over the problem of invention. It is really quite an inspiring thought to think of these hundreds of students all busy with half-formed plans of how to still further chain the lightning and make it serviceable to man. How much of energy and resolute determination it must take! There is another way of looking at it, and that is with all of these people pegging away at the electrical problem, some of them are sure sooner or later to do something which will astonish and bless mankind.—*Cincinnati Times-Star.*

How Secretary Manning Came to Get His Electric Light Building Free of Rent.

Those of our readers present at the Baltimore Electric Light Convention will recollect that a gentleman from Albany made complaint against a leading electric light company, claiming that his company's rights were being invaded. According to what follows, it may have been only the revenge of time. Says an esteemed correspondent:

"The friends of Daniel Manning are a good deal worried over his present illness. Mr. Manning has a wide circle of friends and acquaintances, who are generally deeply attached to him by reason of his blunt and stanch loyalty to those around him, no less than on account of his unflinching independence, and his determined manner of putting his foot down when he once says a thing. Mr. Manning is regarded throughout New York State as a man of very great strength, not only in politics, but in the conduct of all his affairs. He must be a very rich man, and his property is pretty much all traceable to ingenious methods of manipulation. He is a heavy owner of banking and electric lighting stocks, which have increased enormously in value since he became possessed of them. Mr. Manning's electric lighting scheme was cleverly worked. He arranged a contract with the city of Albany under which he should light the streets of that municipality to the exclusion of all other methods of illumination. It must have taken some pretty clever figuring to bring about such an end as this, for the reason that the city at that time already had a contract with a gas company, this agreement still having two years to run. Mr. Manning got his little privilege just the same, however, and the gas company promptly sued the city. That suit is still pending. Mr. Manning's fine work did not end here. Out in the suburbs of Albany there is a big building which was for years employed as the factory of the James McBride Davidson Safe Company. For some reason or other, with which I am not acquainted, the building was deserted by its early occupiers, and had remained idle for several years. The owners had been paying taxes on it, but the windows had been broken out by mischievous boys, and the structure fell into a state of general demoralization. Mr. Manning went up to the proprietors one fine day and mad ethem an offer for it, saying he would put the building into a state of repairand keep it in good condition, if they would give him the free use of it for a term of years. They had so long found it impossible to rent the property or to get anybody to take it as a gift that they accepted Mr. Manning's proposition. He put his electric lighting apparatus into the building, erected an additional house of large proportions, covering the rest of the block, and started into business. Nowadays there is not a gas lamp burning in the streets of Albany. The old lamp-posts are used in the business portions of the city as standards for advertising signs, and in the residential quarters are employed to indicate the names of the streets. Down in the hollow, where it has been found difficult to utilize the electric light, kerosene lamps are used. The electric arrang ment is found in Albany to be extremely satisfactory, and Mr. Manning is consequently looked upon as a philanthropist. In many of the streets trees grow so thickly that their branches almost touch each other overhead, and there it has been found difficult to put up the ordinary poles with any chance of lighting the street beneath. To get over this obstacle, comparatively short uprights have been placed on each side of the rodways at brief intervals, with wire cables stretched across the drives. In the middle of these cables, directly over the center of the tree-grown thoroughfares, hang the electric lamps, and a drive along beneath them in the night is regarded with great rapture by the general run of Albanians. Under such skillful direction as that which I have here described, it is certainly not a matter of deep and far reaching wonder that Mr. Manning's enterprises have prospered many fold. He is probably the most characteristic man in Cleveland's entire cabinet. I heard it said in Washington, among people who surely ought to be well posted, that of all the men surrounding the President, Mr. Manning is the only one who never resorts to finesse or compliment. When he wants to have anything done, he simply blurts it out in an emphatic, decided manner, without beating about the bush. He uses no formalities, seldom addresses the President by his title, and impresses those near him as a plain, straightforward, outspoken man, who doesn't care a continental what anybody may think of his methods. He has certainly surrounded himself with a very large circle of admiring friends, and everywhere among them I hear expressions of solicitude lest his ill health shall make it necessary for him to retire from the cabinet."

The Bids for Public Lighting in Detroit.

About twenty representatives of the various corporations which submitted proposals for lighting the city during the fiscal year commencing July 1, gathered at the office of the controller, in Detroit, March 24, at noon, the hour appointed for opening the bids. In all there were five bids submitted, three for electricity and one each for gas and kerosene.

The bid of the Brush Company was $114,500, to light the whole city by the tower and pole system, and the City Hall and Market building with gas and electricity, as at present. The specifications under which the bid is made call for 122 towers, carrying 488 arc lights, and 77 posts, each with one light, all to be of 2,000 candle-power, together with the present number of arc lights in the City Hall and Market building and substantially the same amount of gas as was required this current year.

The Thomson-Houston Company submitted two distinct propositions, under the specifications dividing the city into two districts, one being the territory bounded by Twelfth and Dequindre streets, and Fremont street and the river, and to be lighted with arc electric lights suspended in the center of each alternate street intersection, and four electric towers. The outer district, including the territory in the city limits not included in the central district, and to be lighted by 40 towers carrying four arc lights and 40 pole lights, together with the present number of lights in the city buildings. For 2,000 candle-power lights the company's bid is 77 cents per light per night for towers and 57 cents per night for pole lights. For divided arc or mercantile lights of 1,300 candle-power, the bid is 65 cents per light per night for towers and 45 cents for pole lights. The total cost for 2,000 candle-power lights would be $131,374.45, and $106,452.25 for 1,300 candle-power lights.

For lighting the entire city adjacent to the gas mains the Detroit Gas Company's bid is $53,836, extra lights to be furnished at the rate of $18 per annum. This bid provides for 2,664 lights, 1,352 on the west side and 1,312 on the east side of Woodward avenue, or 664 more than were used the last year the city was lighted with gas. The bids of the gas and naphtha companies to light the territory not reached by the gas mains are supplemental to the gaslight bid.

The Wheeler Reflector Company, of Boston, bid $14.60 per post per annum, a total of $43,800; for the same service the Sun Vapor Light Company, of Canton, O., bid $20 per post, or $60,000, and the Michigan Gas Company $17 per post or $51,000.

Combining the bids of the gas company and the Wheeler Company, the lowest of the naphtha bids, the gross bid is $97,636, or $16,864 less than the bid of the Brush Company, the lowest for electricity.

Controller Chesebrough will send a summary of the bids to the Lower House without any recommendation, preferring to let thealdermen fight it out among themselves as to which of the bidders shall receive the contract. There is considerable interest taken in this contract, as it is a valuable one, The Brush Company, as is generally known, lights the city at present, using the tower system of lighting.

—— A new method of testing the efficiency of dynamos, which was suggested by Dr. J. Hopkinson, F.R.S., was recently tried at the works of Messrs. Mather and Platt. The dynamos are coupled with their shafts in line, and driven by the same driving pulley and belt, situated at the center of the joint shaft. One machine was employed as a generator, the other as a motor; and the engine only supplied the difference or loss of power in the electrical arrangement, since the dynamos were connected in circuit so that the generator drove the motor, and the same current of 521 amperes passed through both armatures. It is stated that the method allowed of a determination of efficiency to ½ per cent., instead of 3 per cent., as by the usual method. The machines showed an efficiency of 93 per cent.

—— At a recent meeting of the Royal Society of Edinburg, Professor Blythe, M.A., described a method of finding the strength of an electric current by means of an adaptation of the chemical balance. He said that he had been driven to try this method owing to the difficulty experienced in measuring currents in the ordinary way, by the tangent galvanometer, in a laboratory where there was a great deal of iron, and especially a dynamo machine. The apparatus depended on the calculation of the attraction between two parallel circles of copper wire of a certain radius, and at a certain distance apart. He had found that in such a case each time that the same current was passed through the copper wire an invariable result was obtained. In the apparatus, which the learned professor described, these circles of copper were made to take the place of the scale pans of the balance, the wire being carefully insulated between discs of glass. The current was made to pass through the coils, over the scale beam, and through the scale beam, care being taken not to interfere with the sensibility of the balance.

—— The electric light contract was signed yesterday (March 30th) afternoon by President Stotzer and the Police Committee, an behalf of the borough, and Mr. Phelps, for the Western Electric Light Company, and has been forwarded to Chicago for the signatures of the officers of the company. The contract calls for two Ide automatic cut-off engines, sixty horse-power each, two steel horizontal boilers, seventy horse-power each, a sixty-five-foot stack, etc., the whole steam power to be set up ready for use by the contractors; three twenty-five-light Western arc dynamos, sixty arc lamps, chestnut poles painted, twelve miles of wire, etc., the whole to be complete and in operation on or before July 1st next. The borough is to erect the building. The contract is complete in all details, specifying almost every article, from a wrench to the engine. It is believed that the entire work will be completed by June 1. The company must have great faith in the quality of their light as a trial of two months will be allowed before asking Council to accept it.—*Easton* (Pa.) *Express.*

—— At a recent meeting of the Cincinnati Academy of Medicine the uses of "chloral" as a remedy were pretty thoroughly discussed. The experience of the profession seemed to be that "chloral was an uncertain and treacherous remedy." Some persons are more affected by a dose of four grains than others are by a dose of twenty grains. Cases were reported where 200 grains per day had been given, and one case, reported by Dr Beck, of the Baden army, where 430 grains were given in three and a half hours, the patient sleeping for thirty hours and recovering. The profession also agreed that chloral cannot successfully be administered hypodermically. There were cases reported also where death was caused by the administration of ten or twenty grain doses, and where dangerous symptoms resulted from a single five-grain dose. Such a remedy cannot be regarded less than dangerous in any except the most skilful hands.

—— The Cottage City Gas Company, of Cottage City, Mass, will add electric lighting to its business.

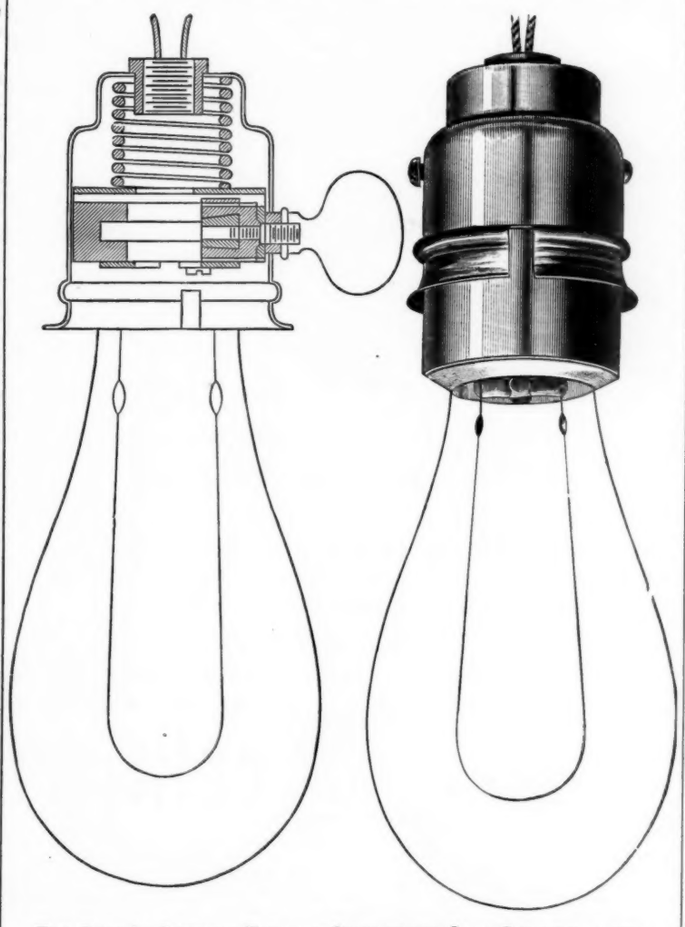
—— Manufacturers who are depending largely on natural gas, and those who expect to be provided with it at a long distance from the wells, have been interested in the announcement of a patent which will carry it safely any desired distance. It is a process of mixing air with gas in such proportions that, while the danger of explosion is taken away, all the heating quality still remains. It will also leave the air of the rooms in which it is used in a healthy condition.

—— Several men were charged lately in London police court with being concerned in the theft of meat from the shop of Mr. F. G. Chapman, a butcher. Mr. Chapman is an amateur electrician, and in this instance made good use of his knowledge in detecting and procuring the apprehension of the thieves. For several years he has had an installation of electric lighting on his premises, a gas engine being used during the day for charging accumulators and driving a sausage machine, and at night for lighting the front of his shop by means of an arc lamp; incandescent lamps supplied by the accumulators lighting the interior of the shop. Having suspicions as to considerable losses of meat, Mr. Chapman early one morning secreted himself at the back of the shop and watched, with the result that he saw his shopman hand quantities of meat to a number of men who entered the shop one after the other, before the shutters were raised. He had arranged with two detectives to have an electric light at the top of the house, and connected with the place where he was concealed; he signaled to the detectives by switching on the light as the men left the shop with the meat, and the detectives encountered and arrested them.

—— At a recent meeting of the Tesla Electric Light and Manufacturing Company the following directors were elected: Edward Schell, P. Van Zandt Lane, B. A. Vail, C. B. Carman, N. Tesla, Robt. Lane and Wm. Carman.

—— The officers of the Tesla Electric Light Company, Rahway, N. J., are B. A. Vail, president; Robert Lane, vice president and treasurer; superintendent, Wm. Carman; electrician, Nikola Tesla; secretary, H. C Carman.

——The Thomson-Houston Electric Lighting Company, of Detroit, has filed articles of incorporation, the capital stock being $50,000, all paid in. The officers and shareholders of the company are as follows: President, J. L. Hudson, 200 shares; vice-president, John B. Corliss, agent, 400; treasurer, E. C. Preston, 400; manager, John H. Hapgood, 800; secretary, E. Brady Wendell, 200.



FIGS. 7 AND 8.—SECTIONAL VIEW AND INCANDESCENT LAMP COMPLETE OF THE SCHAEFER COMPANY.

—— The Thomson-Houston Electric Light Company has shipped four dynamos and several arc and incandescent lamps to the Edinburg, Scotland, exhibition. This is a commendable enterprise.

—— Several of the bright and active electric light gentlemen of Chicago have been in New York the past week, among them Mr. T. H. Bailey, of the Thomson-Houston, and Messrs. Warren and Reid, of the United States Company.

—— The Thomson-Houston Company, at Northampton, Mass., has taken the entire basement of Clapp's foundry, and will put in a new engine of 75 horse-power to run its two dynamos, while an additional boiler will also be put in at once.

——Mr. Chas. J. Klein of this city, is now with the Westinghouse Electric Company, and Mr. G. M. De Munde has accepted a position with the Brooklyn Electric Construction Company. Both of these gentlemen are competent and enterprising, and will do good work for their respective companies.

—— The Amoskeag Manufacturing Company, of New Hampshire, is to put a Weston incandescent machine on trial in one of the canal buildings, and if its working proves satisfactory the new Jefferson Mill will be lighted with incandescent lights. It is safe to predict that the Weston light will prove satisfactory.

ELECTRIC LIGHT NEWS

—— Hoboken, N. J., has a social organization known as the "Electric Light Club."

—— The Providence, R. I., council has authorized a contract for fifty additional Thomson-Houston arc lights; contract to terminate June 15, 1887.

—— Mr. Silvey, of Cincinnati, who claims to have an early patent in "air telegraphing," is at work on a dynamo which, he states, gives remarkable results at low cost.

—— The Stilwell & Bierce Manufacturing Company, Dayton, Ohio, have recently made shipments of water-wheels to Russia, France and Australia.

—— An incandescent plant of 112 lamps is in operation at Higginson's plaster works, Newburgh, N. Y. Geo. M. Kirby, the engineer of the works, has charge of the electrical apparatus.

—— The Saratoga Gas Company has completed arrangements for the establishment of an electric light plant at its Spring Avenue Works, in Saratoga Springs. It is to be in complete operation by the first of June.

—— The Richmond, Va., citizens are so well pleased with their electric light that they are talking of purchasing the plant, which is at present owned by the Schuyler Company, of Hartford, Conn.

—— San Diego is now brilliantly illuminated by the electric light. The illumination is furnished by four masts, each 125 feet in height, in different parts of the city. There are six lights to each mast. The city pays $1,000 for each mast.

—— Sir C. W. Siemens is cited as the authority for the statement that no unlimited degree of temperature can be reached by combustion. When a certain point has been attained dissociation comes into play and both carbon and hydrogen refuse to take up oxygen.

—— The Schuyler Electric Light Company, through their active Western agent, Mr. I. R. Adams, have just closed a contract for 180 lamps to be placed in Wichita, Kan. The same compauy has made arrangements for placing the electric light in Wooster, Ohio.

—— The electric light plant in Terre Haute, Indiana, of which Mr. Edward Ellis is secretary, is giving fine satisfaction and consists of 290 Thomson-Houston lights. The company is contemplating a large addition to the present plant, making the capacity 350 arc lights.

—— A certificate of incorporation of The Atlantic Electric-Light Storage and Power Company was filed in the clerk's office of the Superior Court, Baltimore, April 1st., by Messrs. Edwin W. Rouse, Solomon L. Auerbach, Lewis M. Rosenberg, Chas. J. Wiener and James H. Smith. The corporation is for the purpose of carrying on in the state the manufacture, storage and sale of electricity for lighting and power, and for acquiring and using certain new and useful inventions. The capital stock is $200,000, divided into 2,000 shares of the par value of $100 each.

—— The following bids for lighting New York city have been presented: Consolidated Gas Company, for all the lamps south of Harlem, $17.50 per lamp; New York and Mutual Gas Light Company, $17.50; Equitable Gas Company, $12; Central Gas Light Company, Twenty-third Ward, $28; Northern Gas Light Company, Twenty-fourth Ward, $30; Yonkers Gas Light Company, $30; New Jersey Globe Gas Light Company, for naphtha lamps, $24; United States Illuminating Company, for electric lamps south of Fourteenth street, 70 cents per lamp per night; Brush Electric Light Company, 70 cents per lamp per night.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MARCH 30, 1886.

338,596 Apparatus for measuring electrical currents; Joseph L. Huber, Hamburg, Germany.

338,597 Apparatus for measuring electrical currents; Joseph L. Huber, Hamburg, Germany.

338,606 Apparatus for producing hard carbon from hydrocarbon vapor; James J. McTighe, Pittsburgh, Pa.

338,619 Electric railway; Frank J. Sprague, New York, N. Y.

338,620 Mechanical telephone; Andrew W. Steiger, New York, N. Y., assignor to John A. Cabot and William L. McCreary, both of same place.

339,622 Electric motor; George H. Stout, Chapel Hill, N. J.

338,660 Telephone transmitter; John E. Dann and John Lapp, Honeoye Falls, N. Y.

338,633 Electric cash and parcel transfer system; Geo. F. Green, Kalamazoo, Mich., assignor to himself, Oliver S. Kelly, and Sol. J. Houck, both of Springfield, Ohio.

338,691 Telegraph transmitter; George W. Baldridge, St. Louis, Mo.

338,692 Dynamo electric machine; Royal E. Ball, New York, N. Y.

338,697 Electric hotel call bell system; James L. Beers, New York, N. Y.

338,706 Artificial electric resistance; Harold P. Brown and Francis Herbert Brown, Chicago, Ill.

338,733 Covered or insulated wire; William M. Habirshaw, New York, N. Y.

338,747 Electric gas lighting burner; Charles W. Holtzer, Brookline, Mass.

338,748 Electric gas lighting apparatus; Charles W. Holtzer, Brookline, Mass.

338,752 Automatic safety circuit controller; Oscar F. Jonsson, Stockholm, Sweden.

338,770 Pocket battery; Gustav Otto, Jersey City, N. J.

338,773 Circuit closer for electric clocks; Chester H. Pond, Brooklyn, N. Y.

338,889 Telephone switch; William C. Turnbull, Baltimore, Md.

338,910 Dynamo electric machine; Royal E. Ball, New York, N. Y.

338,919 Means for suspending electric lights; Thomas H. Brady, New Britain, Conn.

338,920 Apparatus for suspending electric lights; Thomas H. Brady, New Britain, Conn.

338,927 Railway signal; Angel Castro, New York, assignor of one-half to George A. Saward, Brooklyn, N. Y.

338,935 Electric alarm clock; George H. Davis, Washington, D. C.

338,938 Galvanic battery and switch for telephone systems; Charles A. A. de St. Aubin, St. Louis, Mo.

338,941 Apparatus for forming wire by electrolysis; Moses G. Farmer, New York, N. Y.

338,971 Underground conduit for electric conductors; Julius M. Jagel, Brooklyn, N. Y.

338,976 Electro magnetic motor; Vincent E. Keegan, Boston, Mass.

338,977 Electric motor; Vincent E. Keegan, Boston, Mass.

338,993 Mechanical telephone; Hugh Lamont Blissfield, Mich., assignor of three-eighths to William Hubbard, Elgin, Ill.

338,996 Branch circuit for quadruplex telegraphs; William Maver, Jr., Jersey City, N. J., assignor to the Baltimore & Ohio Telegraph Co., Baltimore, Md.

339,018 Electric railway; William M. Schlesinger, Philadelphia, Pa.

339,043 Electric horse unhitcher; Andrew J. Coffee, Portland, Oregon.

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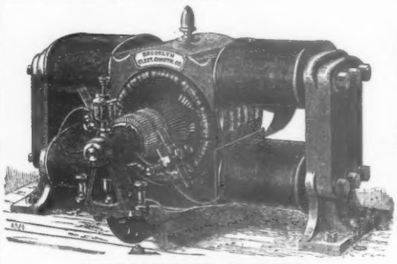
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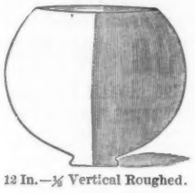

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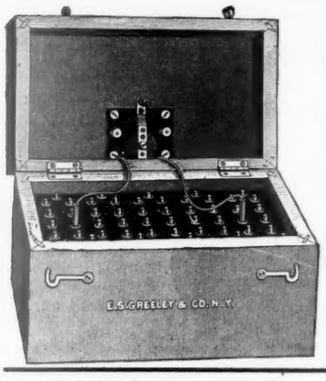

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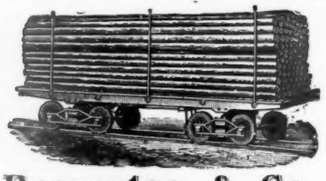

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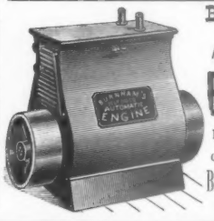

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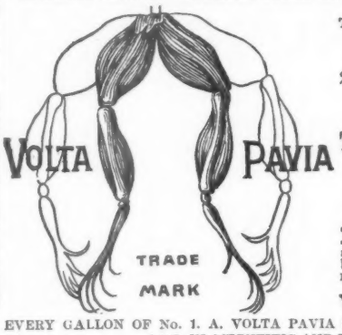

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EDISON.

EXECUTIVE OFFICES, MUTUAL LIFE BUILDING,
32 Nassau Street, New York,
March 23d, 1886.

The Consolidated Electric Light Company is the owner of the Sawyer-Man patents. These patents were issued in 1878, 1879 and 1880, except one of them, which was issued on the 12th of May, 1885, after a contest of five years in the Patent Office with Mr. Thomas A. Edison.

Referring to that contest, the Edison Company advertises, that it did not involve the invention of the filament of carbon.

The fact is that on this identical point

MR. EDISON TESTIFIED IN 1883,

"*My mind was full of the fact that they were endeavoring to deprive me of the use of a filament of carbon;*" and referring to the magnitude of the interests involved, the distinguished

COUNSEL FOR MR. EDISON ARGUED

before the Commissioner of Patents in 1885,

"*The case at bar is one of the most important that has ever been before the tribunal of the Patent office. The pecuniary interests at stake are very great, and legal questions of much importance involved. It has been at issue since 1880, and thousands of folios of testimony taken.*"

The decision was that

"SAWYER & MAN

had the invention in a rude form as early as

MARCH, 1878,

and completed in September or October of the same year;" and that

"EDISON

completed the invention and reduced it to practice on or about

OCTOBER 22d, 1879,"

and a patent was issued to Sawyer & Man for the incandescent conductor for an electric lamp, consisting of carbon, made from a fibrous or textile material, having the form of an arch or loop.

Upon these patents of 1878, 1879, 1880 and 1885 suits are pending against leading electric light companies for infringement.

The Edison Electric Light Co. has advertised that it is the owner of the incandescent electric lamp, and has sent threatening letters to users of the Sawyer-Man system.

This Company, while declining to engage in such warfare, deems it proper to state that the Edison Company has never succeeded in obtaining a decree for the infringement of any of their said patents against any person or corporation:

First. Because the patents upon which the Edison Company has based its threats are for inventions proved, in so far as they are new and useful, to have been made by Sawyer and Man prior to October, 1878, for which patents, as above recited, were issued to them.

Second. Because the patents upon which the Edison Company based such threats, which could have had any possible value, were taken out in certain foreign countries for a short term prior to their issue in this country, which term has ended, and the patents have therefore expired.

This Company deems it proper further to state:

Third. That the Consolidated Electric Light Company will protect all the users of the Sawyer-Man system in the full enjoyment of its privileges.

Fourth. That the controversy in the Patent Office established Sawyer & Man's priority as inventors, and the suits pending in the Courts will determine Edison's liability as an infringer.

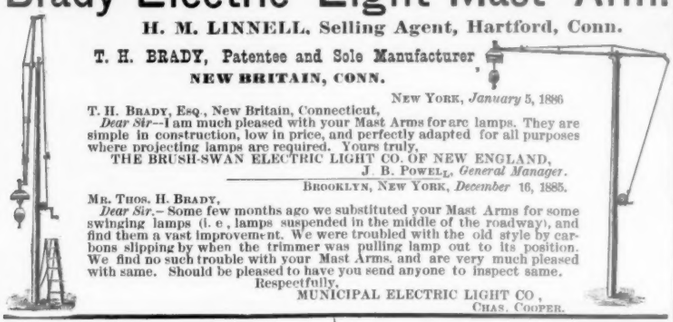
Fifth. That this Company requests those using and those contemplating the use of incandescent electric lights, who have been or may be deterred from purchasing lamps of the Sawyer-Man system, by reason of the threats of the Edison Company, to communicate the fact to this office.

THE CONSOLIDATED ELECTRIC LIGHT CO.

Brady Electric Light Mast Arm.

H. M. LINNELL, Selling Agent, Hartford, Conn.

T. H. BRADY, Patentee and Sole Manufacturer
NEW BRITAIN, CONN.



NEW YORK, *January* 5, 1886

T. H. BRADY, Esq., New Britain, Connecticut,
Dear Sir—I am much pleased with your Mast Arms for arc lamps. They are simple in construction, low in price, and perfectly adapted for all purposes where projecting lamps are required. Yours truly,
THE BRUSH-SWAN ELECTRIC LIGHT CO. OF NEW ENGLAND,
J. B. POWELL, *General Manager*.

BROOKLYN, NEW YORK, *December* 16, 1885.

MR. THOS. H. BRADY,
Dear Sir,—Some few months ago we substituted your Mast Arms for some swinging lamps (i. e., lamps suspended in the middle of the roadway), and find them a vast improvement. We were troubled with the old style by carbons slipping by when the trimmer was pulling lamp out to its position. We find no such trouble with your Mast Arms, and are very much pleased with same. Should be pleased to have you send anyone to inspect same.
Respectfully,
MUNICIPAL ELECTRIC LIGHT CO.,
CHAS. COOPER.

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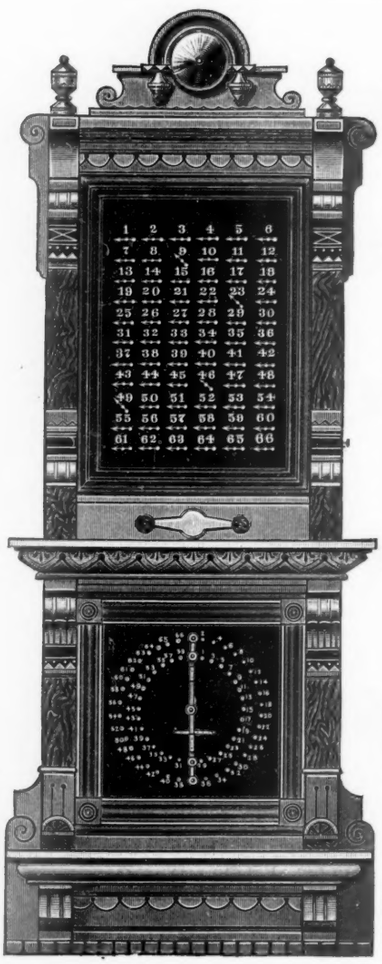

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IS A CONSTANT TEST
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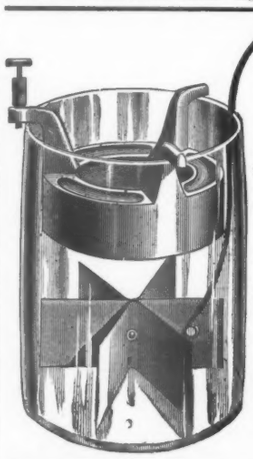

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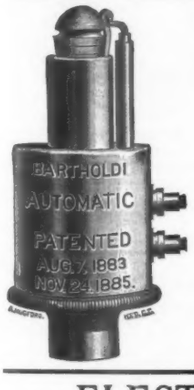

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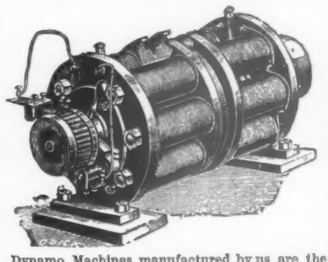

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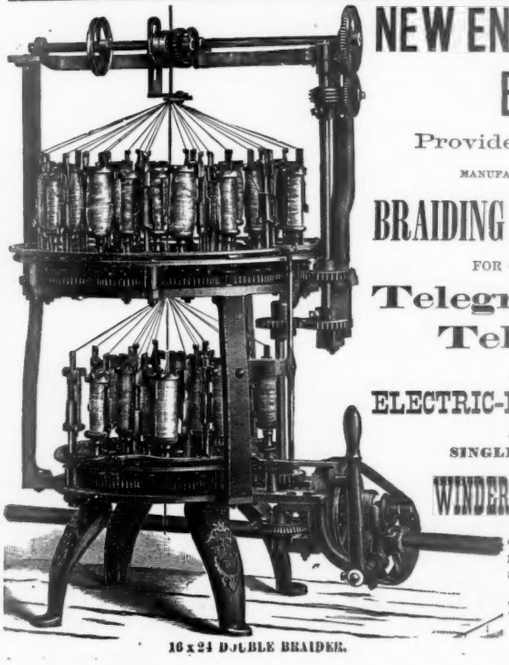

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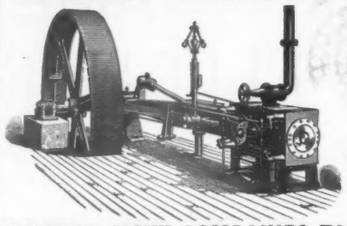

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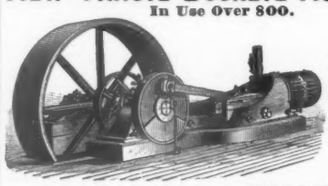

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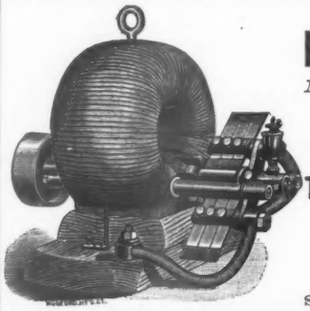

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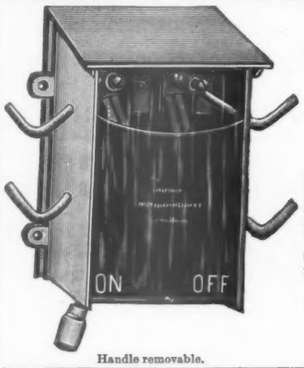

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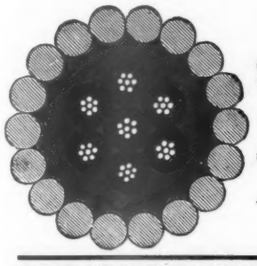

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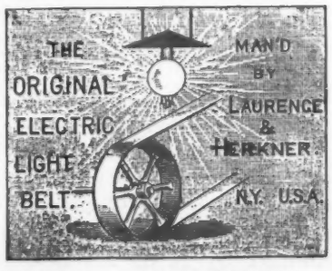

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